THE
ELECTRICAL REVIEW

Volume CXXIX — No. 3328

Friday, September 5, 1941

Contents

	Page
Editorial—Coal and Contracts	183
Precasting Concrete	185
Correspondence	189
Corrosion in Electrical Machinery. By W. Subak	192
Skilled Men for the Forces	194
Requirements in Canada	195
Water-Power and the War	197
Recent Introductions	199
Post-War Sales Policy. By H. C. Arthur	200
Personal and Social	201
Electricity Supply Progress	203
Lamp Sales	204
Commerce and Industry	206
Electricity Supply	209
Financial Section	211
New Patents	216
Contract Information	217
Classified Advertisements	65
Index to Advertisers	76

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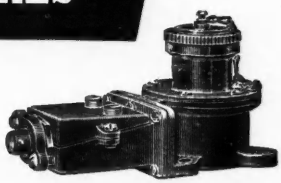

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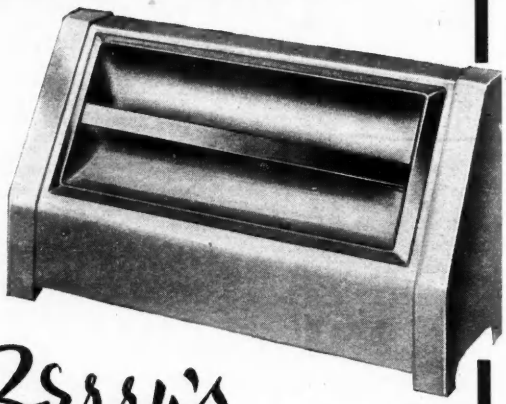

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THE
ELECTRICAL REVIEW
THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXIX. No. 3328. SEPTEMBER 5, 1941 6d. WEEKLY

Coal and Contracts

Replies to Select Committee's Reports

ONE outstanding section of the Eighteenth Report from the Select Committee on National Expenditure, which contains the replies of various Government Departments to previous reports, is the Mines Department's comments on the Committee's Eighth Report dealing with the coal and wagon shortage. After mentioning the steps which have been taken to improve the transport position, the Mines Department says that the shortage of labour is the kernel of the present coal problem and in view of this the programme laid down in March for the building-up of stocks for the winter cannot be achieved. It is noted that priority is being given to the needs of public utility undertakings while non-industrial consumers of coal, coke, electricity and gas have been urged to exercise the strictest economy. The Department goes on to say that "Consideration is being given to the preparation of a comprehensive rationing scheme for use in the event of output not rising sufficiently to remove risks of serious shortages developing during the winter."

As we pointed out in our leading article of August 15th, the position in which the coal industry finds itself has not suddenly arisen and we think that it discloses a lamentable lack of foresight if the Mines Department is only now considering the preparation of a rationing scheme.

In any event the rationing of domestic supplies of electricity will have little effect. It has been estimated that a reduction of from 10 to 25 per cent. in domestic consumption would achieve a saving of only from $\frac{1}{2}$ to $\frac{3}{4}$ of one per cent. in coal consumption and so it is doubtful whether the trouble and expense involved could be justified.

There are a number of other points of interest in the Eighteenth Report. The Select Committee has criticised on more than one occasion the growing use of the "cost plus fee" form of contract by Government Departments. It has been said that the system could only be justified on grounds of speed—which it did not achieve—and should only be used when it was essential to begin and complete work in a matter of days. The Treasury, while admitting the system to be unsatisfactory, says that it is very often unavoidable and the War Office, which seems to be particularly concerned, expresses similar views.

The employment of small firms wherever possible is another matter which has been consistently stressed by the Select Committee. The Ministry of Works and Buildings says that it makes every effort to give local firms the opportunity of tendering for building works. This is difficult on large-scale works, but the Department endeavours to ensure that at least sub-contracting is carried out by local firms.

The Air Ministry states that sub-contracting to specialists is already practised as far as possible but the scope on aerodrome construction is limited. General sub-contracting has been found to be unsatisfactory.

The Treasury's remarks include a state-

ment that as regards credit facilities for small firms comprehensive arrangements have been made in consultation with the banks for the financing of work in progress. These arrangements involve the readiness of the banks to make immediate advances to manufacturers engaged on Government work and of the Departments to make frequent and expeditious progress payments as the work proceeds.

Although it may be contended that the Select Committee is unable to achieve a great deal it serves a very useful purpose in bringing to light many matters which might otherwise remain unchecked, and its reports are always full of matter of the greatest public importance.

Planned Distribution

A VERY considerable engineering feat has been achieved in applying a standard system of distribution to the several undertakings serving densely loaded areas which are amalgamated as Central London Electricity, Ltd. By connecting the lower-voltage networks in solid blocks of 3,000 kVA (each fed by one high-voltage feeder) interlinked through h.r.c. fuses in groups of 12,000 kVA, it should be possible to ensure that increases in load will be met without undue disturbance to the plant and mains and that the plant will serve its full term of life. Complete particulars will be given in a Transmission Section paper by Mr. J. W. Leach, which is to appear in the I.E.E. *Journal* for December. From the advance abstract in the July issue it is clear that this will be of great practical importance.

Demand for Skilled Men

MODERN warfare calls for a vast extension of a country's engineering industries and this brings with it a need not only for skilled men to produce aeroplanes, tanks, battleships and guns but also for equally skilled men to maintain them in service. In the early stages the main demand is from the arms-producing factories but as the output of these increases the balance shifts to the Forces and there arises a kind of competition for these men. Although the Services can adopt expedients for securing and training men which are not generally applicable to civilians, such methods have their limits and there is inevitably a demand for men from the factories. The subject is dealt with by the Committee on Skilled Men in the Forces whose interim report is reviewed in this issue. The problem is a very difficult one and the solution which the Committee propounds is probably the only way out, but great care will have to be exercised in its application lest we arrive at a position similar to that which has arisen in the mining industry.

Supply Statistics

ALTHOUGH no detailed Returns of Engineering and Financial Statistics relating to electricity supply undertakings will be issued by the Electricity Commissioners during the war, we are able to present this week certain summaries for 1938/39. This period includes the first seven months of the war and, apart from a falling-off in the rate of increase in kWh generated, there is little to distinguish it from previous years. We regret that it is not permissible to publish such information as thermal efficiencies or the output and number of consumers of individual authorities.

Paper Saving

ON account of the serious shortage of pulp for paper-making the necessity for conserving what we have is of the utmost importance and every scrap of re-usable paper should be saved. The Controller of Salvage has instituted another great " drive " with the collaboration of the local authorities of the Greater London area by which it is hoped to collect immense quantities of waste paper. Business firms are urged to bring out their old records, ledgers, trade papers, directories, etc., which no longer serve any useful purpose. We endorse this appeal, but at the same time hope that due discrimination will be exercised lest valuable records be lost to posterity. With a view, no doubt, to emphasising the importance of the matter the Controller has sent us five copies of his appeal.

The Dnieper Dam

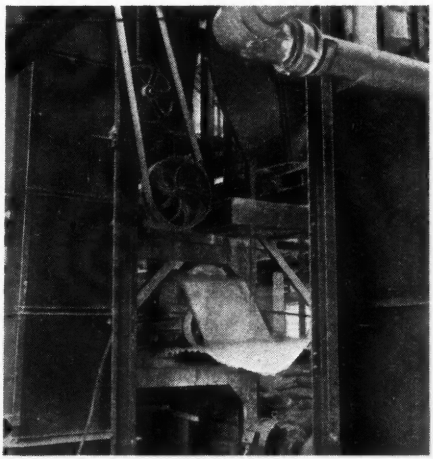
CONFIRMATION is now available of the destruction by the Russians of the great Dnieper Dam to which we referred in our last issue. It is typical of the indomitable spirit of our Allies that they should sacrifice what was not only a most important power scheme but a striking monument to the success of their first Five-Year Plan.

Precasting Concrete

The Modern Method of Producing Concrete Components Involves some Interesting Electrical Applications

AT the new works of Hulland Products, Ltd., a subsidiary company of the Hulland Gravel Co., Ltd., the electrical installation and applications at whose workings were described in the ELECTRICAL REVIEW of February 14th, 1941, we recently saw the processes involved in the modern method of precasting concrete components, that is, producing them in the factory ready for assembly on site. Among the many products of the company are kerbstones, paving slabs, cable protection covers, door and window lintels, hollow blocks for wall construction or wartime protection in place of sandbags, and air-raid shelter members. The new method of production eliminates the arduous stone-cutting operations at the quarry workings in the case of kerb- and flag-stones, and reduces concrete mixing on the building site to a minimum.

Production is carried out at the quarry site, and one can hardly imagine any driving medium other than electricity being employed for the machinery, so that it is quite reasonable to claim that the development is directly the result of to-day's availability of public electricity supply in outlying districts where quarries are to be found. The Hulland quarry and works are situated high up in the Derbyshire hills, where they receive an 11-kV supply from the Derbyshire and Nottinghamshire Electric Power Co.



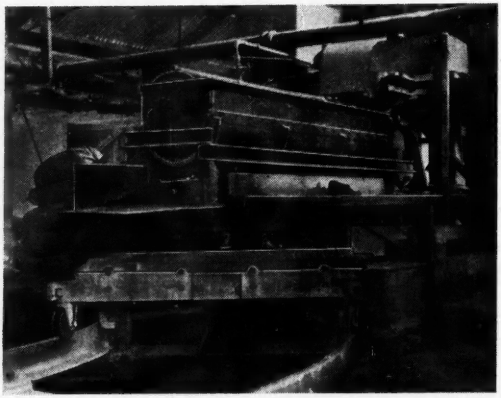
The slab press showing the driving arrangements for the elevators and belt measurers

There are two methods of mechanical production for concrete components — pressure and vibration—and the choice rests with the customer. These call for different types of production equipment, as do the different classes of components. For the production of paving slabs the pressure method is almost exclusively employed. A hydro-vibrate press fed by a Powell & Hill mixer, are the units used in this connection. Sand and gravel from the adjacent quarry are conveyed by a bucket elevator at the end of this machine to a point about 20 ft. above floor level, where they are tipped over into a receiving hopper from which they fall on to a measuring belt, the speed of which is such as to serve the right quantity to the machine proper. At right-angles to this elevator is another and similar one for cement feeding. The cement is passed through a hopper on to another measuring belt, disposed at right-angles too, and with its discharge end just above the sand and gravel unit. Hence the two materials meet on the bottom or main feeding belt.

This main feeder delivers the three dry materials into a trough mixer in which there is a central shaft carrying a number of paddles so fitted that in addition to mixing the materials, the mixture is carried along the horizontal trough to the discharge end of the machine. Water is spray-fed from an overhead tank into the mixing trough during these operations. The sand and gravel and the cement elevators have a common group drive from a 12-HP, 1,930-RPM, squirrel-cage motor situated on the floor immediately under the main measuring belt. This motor first transmits by belt on to a countershaft, with a speed reduction ratio of about 2 to 1. From this countershaft there is a practically even ratio belt drive on to a second countershaft at the top of the machine from which both the bucket elevators are served.

For the cement elevator there is gearing on this top countershaft, but there is also another belt transmission down to fast and loose pulleys from which there is chain transmission for the cement measuring belt. There is a speed reduction ratio of about 3 to 1 on both

the belt drive down and the chain. The sand and gravel elevator is also driven from the overhead shaft through bevel gearing. A second belt from the bottom (the first countershaft) serves the trough mixer initially with a



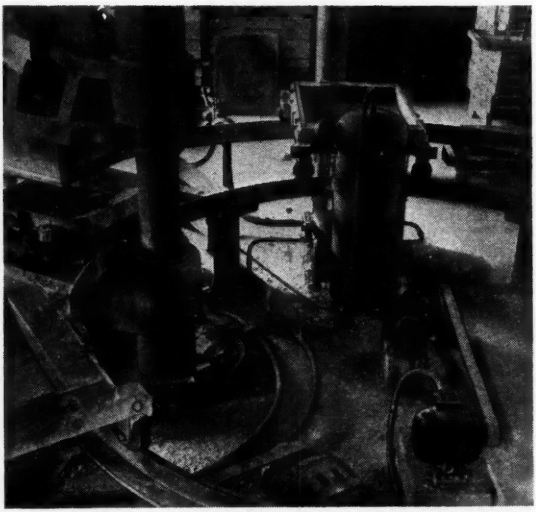
The vibrator and trough mixer components of the slab press

1 to 1 reduction on the belt, and then through gearing to give the mixing shaft a speed of about 50 RPM. This means that from the first countershaft there are two transmissions, one upward for both elevators and the measuring belts, and one horizontally for the trough mixer. With a 1 to 1 ratio there is a second chain transmission from the shaft of the first chain drive, the second chain driving directly on to the end pulley of the cement belt measurer. From the fast and loose pulleys there is also a shaft which first transmits from bevel gearing to a right-angle drive on to the end pulley of the sand and gravel measuring belt.

The trough mixer discharges on to a chute immediately over and feeding the slab mounding frames, which travel on a circular rail track. The moulds are filled with the mixture up to, say, within half an inch from the top, and the moulds are pushed round the track by hand. Each filled mould is first taken round to a mechanical vibrator immediately under the track. This vibrator is driven by a 3-HP, 1,425-RPM motor, which first transmits on to a two-speed pulley system on a shaft which carries a central cam pulley.

Immediately over this cam device is a short vertical shaft, which moves freely in guides so that it receives upward "kicks" which are transmitted to the loose bottom of the mould. Engagement of the cam and the vertical shaft is effected by a foot lever which raises the whole two-speed pulley unit, which is suitably hinged. The power transmission is such that the mould receives about 1,000 vibrations per minute.

From the vibrating stock the mould is pushed round the track to the press which is constructed about the track. Here the mould first receives a perforated plate directly on top of the mixture, and it is then placed between the fixed (top) and moveable (bottom) members of a hydraulic press. The bottom member is raised under valve control and during the pressing operation water from the mixture escapes through the perforated plate and passes out through grooves in the mould frame. The mould is then passed on to an ejector equipment, also disposed about the track, by means of which the pressed slab is pushed out of the mould from the bottom by an upward-moving ram hydraulically which is operated in a similar manner to



A view of the circular track from the machine platform showing the hydraulic press and the ejector

that employed in the pressing equipment. Both the press and the ejector are served by a hydraulic accumulator with suitable valve control, and this accumulator is charged by a set of three-throw pumps driven by a 30-HP, 930-RPM motor with an initial belt transmission with a reduction ratio of about 3 to 1

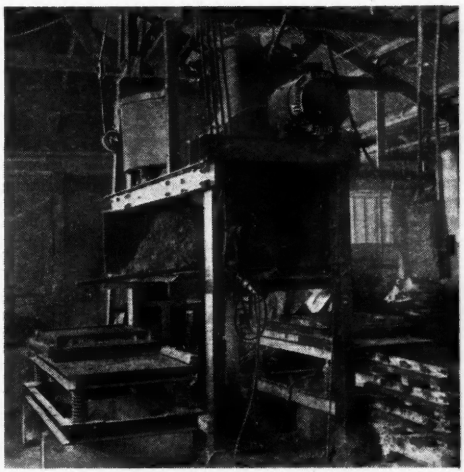
The hydraulic accumulator and pump serving the pressing plant

on to the pump pulley from which there is a very large V-gear reduction on to the plunger shaft of the pumps. Water is pumped direct to the ram chamber of the accumulator lifting the 25-ton sand weighted cylinder. As the tank falls the water passes through suitable valves to the press and the ejector. The pressure operating on each slab is about one ton per sq. inch, but a very small pressure is required to operate the ejector.

The "green" ejected slab is next lifted from the raised mould bottom by a vacuum lifting equipment. This has a plate about the size of the slab, which is carried by an arm pivoted at and sliding up and down a supporting pedestal. The plate is ringed on the underside by a rubber sealing tube, which bears on the slab, and a hole at the centre of the plate connects with the cylinder of a vacuum pumping equipment by means of a flexible tube. The slab is thus held to the plate by suction. The vacuum pump has a 3 to 1 belt transmission drive from a 1-HP, 1,420-RPM motor. The slab is lowered on to supporting tables, where it is released from the holding plate when a cock in the flexible tube is operated to release the vacuum. The slabs are subsequently stacked in tiers in wooden stands and left to dry and set before being stacked outside for maturing pending dispatch.

An alternative method of making the slabs is by vibration, and it should be emphasised here that the machine just described actually employs the pressure method. (The vibration operation referred to is a means of consolidation, increasing density and improving surfacing.) On a machine effecting actual production by the vibration method, sand and gravel and cement are loaded into a hopper which is lifted by ropes to the top of the machine and self-tipped into a "Liner Cumflow" mixing pan. This pan revolves and inside it are two fixed blades and a revolving star carrying a group of blades. One fixed blade bears on the inside perimeter of the pan, thus keeping the inside wall surface clear, while the other is operated with the discharge door at the centre of the bottom of the pan. During the mixing operation water is sprayed into the pan from a tank situated above it.

When the material is fully mixed the discharge door is opened by a hand wheel, and at the same time the discharge blade is lowered to the pan bottom where it acts as a feeding guide for the material. The movements of this blade and the door are governed by a system of levers and screw threads operated by a hand-wheel. The mixed material falls on to a platform from which it is raked

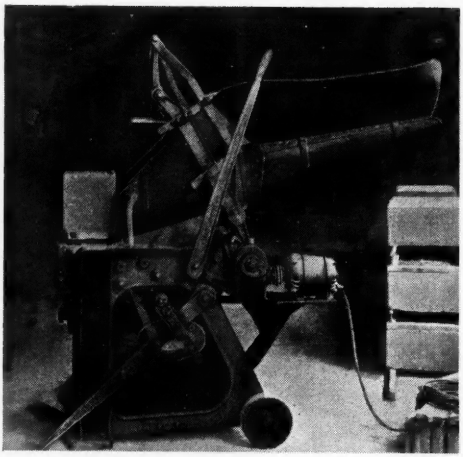


The vibrating tables at work with the mixing machine

into suitable moulds on the vibrating tables, which are really separate portable machines and during operations are situated one on each side of the mixing machine.

There is a common drive for all the operations on the mixer. The 5-HP, 720-RPM motor first drives through a train of gears on to a horizontal shaft under the pan and then on to gears at the other (receiving) end of the machine. The pan itself is driven from the first gearing train at an intermediate stage, a spur wheel on the shaft engaging with a rack on the bottom of the pan. From the pan shaft there is a double-right-angle spur transmission—up, along and down—to the revolving star inside the pan. Thus the whole of the mixing drives are taken from the motor end of the machine. From the other end of the machine the hopper is lifted through a clutch gear.

Each vibrating table is operated by a motor suspended from and bolted to the vibrating plate. The motor itself is the actual vibrating medium, and the movement is brought about by a deliberately unbalanced shaft. The motor shaft carries an out-of-centre disc like the middle part of an eccentric. The result is that the motor runs very much out of balance, giving what would normally be considered very bad behaviour for the usual industrial drive.



The hollow block machine standing, i.e., remote from the mixing machine

The motor is a 2-HP, 1,750-RPM unit and the table vibration rate is equal to the speed of the motor. The vibrating tables are used for the production of such articles as slabs, kerbstones, lintels and posts. The vibration method of production is also employed for hollow blocks, but in this case another type of machine, the "Trianco," replaces the vibrating table. The machine is placed alongside the mixer so that its feeding hopper is situated immediately under the revolving mixing pan from which the hopper is directly fed. The mixture is then passed down a chute to the moulding box at one end of the machine. During the filling operation the bottom of the mould is vibrated by means of a small motor on the side of the machine.

On the shaft of the gearbox driven by the motor is an acute cam which imparts "kicks" to a roller brought into contact with it. The kicks are transmitted on to the mould bottom through a system of relays. When the mould is filled a pressure head is lowered to bear on the concrete mixture, by means of a hand-lever, the operation of which also releases the vibration equipment and movement. After it is sufficiently pressed the casting is ejected by another hand-lever which raises the mould bottom. The casting is then lifted from the mould bottom by a special hand-carrier, and stacked, first for drying and setting, and then for ageing.

It was a little surprising to find that for this vibrating operation only a ½-HP, 1,400-RPM motor is required. The machine will produce 90 hollow blocks per hour. The vibrating tables and the hollow-block machine are all fed by trailing cables with plug-and-socket connections on the mixing machine. Each vibrating table will produce 30 castings per hour, and the pressure machine has an output of 60 paving slabs per hour.

We are indebted to Hulland Products, Ltd., for permission to visit the works, and to Mr. E. Wheatcroft, managing director, for his help in the collection of the above information.

Liquid-Flow Switch

A SAFEGUARDING switch for automatically actuating alarm or regulating devices associated with liquid flow, such as cooling water, is offered in an improved form by Negretti & Zambra, Ltd., 122, Regent Street, London, W.1. It consists of a gate type valve capable of precise adjustment by means of a movable key and provided with a by-pass limb in which a float moves vertically.

Pivoted on a bracket are a mercury-in-glass tube and a magnet, which projects across the exterior of the thin by-pass tube in line with a steel core at the lower end of the float. Movement of the latter by liquid pressure difference between the two limbs of the valve tilts the magnet together with the mercury switch, the rating of which is 2 A at 250 V, so permitting the operation of warning signals, or relays and automatic switchgear.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Plans for Reorganisation

THE article by Mr. J. J. Lesser under the above heading in your issue of August 15th last is, I think, most opportune and raises a number of important points in connection with the subject which should give rise to serious thought and engage the immediate attention of all those interested in the future of the electricity supply industry and particularly the associations and other bodies which represent the various sections of the industry.

In view of the limited space available under present conditions, my remarks must be confined to a few of the more important points raised, *viz.* :—

1. Mr. Lesser is evidently unaware of the existence of the Joint Committee of Electricity Supply Associations which includes representatives of all sections of the supply industry, namely, the I.M.E.A., the company organisations and the Joint Electricity Authorities, and I therefore suggest that the representative committee, which he proposes should be set up, already exists.

2. It seems to me that the varying tariffs which undertakings are called upon to pay for supplies from the grid, have not only handicapped development in many instances, but also prevented anything like uniformity in the tariffs available to the consumer.

3. In the case of the two consumers mentioned by Mr. Lesser as "X" and "Y," it would be interesting to know whether these are recent cases. Personally I should be surprised to hear that they are and still more surprised if they occurred in areas supplied by municipally owned undertakings.

4. I suggest that only in a comparatively small number of cases will amalgamations overcome most of our present difficulties and anomalies or lead to a cheaper and more abundant supply being available to the consumer. From my own personal knowledge I could cite many instances where lower tariffs are available in areas supplied by the smaller undertakings than in many of the larger areas.

As I see it, the following are amongst the more important matters which need to be dealt with:—

(*a*) Legislation should be introduced to ensure that only qualified contractors are permitted to carry out installation work and these firms should be licensed or registered as in the case of plumbers. As stated by Mr. Lesser, the consumer relies upon the skill and knowledge of the contractor, whom he looks upon as his expert adviser, and frequently, under present conditions, gets let down by so doing and will continue to be let down until legislation is introduced to prevent the indiscriminate use of the title "electrical contractor" by unqualified persons.

(*b*) The Ministry of Works and Buildings should have power to ensure in the case of new and reconstructed commercial and other large buildings that architects or owners shall make provision for adequate vertical mains throughout, to cater for reasonable supplies for purposes other than lighting.

(*c*) The grid tariff needs revision, particularly if space-heating loads in large buildings are to be secured in competition with hot-water heating.

(*d*) In the case of suggested amalgamations, the importance of the personal element should never be overlooked. It is probably true to say that there are no two consumers whose conditions of supply are identical, and for this reason there is no public service where the personal touch of the man on the spot, who has authority to deal first-hand with any complaints or difficulties and who knows the local conditions of those residing in the area, has so great a bearing on the success or failure of the undertaking.

It seems quite obvious from statements already made that when the time comes for reconstruction after the termination of hostilities, the electricity supply industry will not escape attention in various directions and I seriously suggest, as I did at the time when the McGowan Report and the subsequent White Paper were introduced, that those within the industry know best the anomalies and weak spots that exist, and any proposals for dealing with these matters should be submitted from within by those with intimate personal knowledge of the subject and who, as a result, know what they are talking about, rather than by legislators and others outside the industry who almost invariably have little or no practical experience and at best merely possess a superficial knowledge of the problems to be dealt with.

I will only add, in conclusion, that matters of such vital importance to the future of the industry cannot be adequately considered when

legislation is imminent and a Bill in course of preparation, as the various sections are apt, in such circumstances, to look at matters from their own particular angle, as they appear in the heat of the moment, instead of taking a broad view of the position as a whole. Therefore I suggest that if we are to be ready for the peace, then, to endorse Mr. Lesser's words, " the time for planning is *now*."

Newcastle, Staffs. A. J. C. DERENZI,
Hon. Secretary,
Committee of Smaller Municipal Electricity Supply Undertakings.

Reading Matter for the Blind

THERE would appear to be several things to consider before embarking upon any research to produce an instrument such as Mr. C. Turnbull suggests in your issue of August 29th. The " Optophone " of Fournier d'Albe was evolved about thirty years ago to enable blind people to read ordinary printed matter such as books and newspapers, the light reflected from the characters as they were scanned producing different musical sounds; the alphabet could be learned in about eight hours and did not require a particularly musical ear.

In Barr & Stroud's modification of the " Optophone " the black of the type was made responsible for controlling the sound rather than the reflecting power of the white page, and this " black-sounding " instrument possesses many mechanical improvements. It will be remembered that Brown later developed the " Phonopticon," which dictated the shape of letters by changes in intensity of the sound produced in three telephones.

An important point, however, is the fact that most blind people may be assumed to be already familiar with reading by sense of touch, and such devices as the " Electrograph " and " Visagraph " therefore deserve at least very careful consideration. A compact scanning device throws a magnified image of the letters upon a network of some forty photo-cells, each of which controls an amplifying system and electro-magnetic relay ; the relays operate small metal rods the ends of which are normally level and form a rectangular grating the size of the finger-tip. As the printed matter passes beneath the scanner, the appropriate rods are automatically raised to form a relief pattern which is interpreted by touch.

The " Visograph " machine is a highly ingenious arrangement in which only a single photo-cell is used in conjunction with a scanning disc having six concentric perforated rings which provide six different frequencies to operate a device, again of vertical rods, that this time produces a permanent raised impression on a travelling sheet of metal foil. The size of the relief characters can be varied at will, to suit individual fingers—a most valuable added luxury.

The Morse strip suggested by your correspondent would seem to involve translating the printed matter into code in the first place, and the learning of a musical alphabet or its equivalent by the user. It would be interesting to have the reactions of a number of blind persons as to whether they would prefer a photo-electric method of converting printed matter into raised characters to be read by finger touch or into musical signals to be interpreted by ear. In either case I would suggest that, were Mr. Turnbull's idea to be acted upon, an instrument of the " Visograph " type could be used to translate the printed matter into *raised* Morse characters on the tape, which could then be used at will as Braille or to produce musical signals.

Pinner, Middx. T. THORNE BAKER.

IN your issue August 29th, the question is asked why the Braille system is not supplemented by the Morse code.

Mr. H. J. Wagg stated five years ago that " the Morse code fails for touch-reading." Has any subsequent development modified that opinion ?

Your correspondent, if memory serves me, reported at that time an invention of special Morse embossed for touch-reading which had not been submitted to trial. Has it been tried since ?

The proportion of " legally " blind in this area at that time was one per thousand of the population. Two read Braille at speed and possessed Talking Books. The remainder (fifteen) took no interest in literature.

Herne Bay, Kent. THEODORE STEVENS.

Commercial Professional Staffs' Salaries

IT is evident from Mr. A. E. Morgan's reply to my recent letter on the above subject that he has interpreted it as an attack upon the salaries paid to the engineering profession rather than as a plea for the proper recognition of the work of commercial staffs. This is to be regretted since I can assure him that I have the healthiest respect for the technical attainments of his profession, and only wish that there was a more general appreciation among engineers for the work of their commercial colleagues. I think my previous letter, so far from detracting from the merits of the E.P.E.A., made it clear that this was an association to be emulated, but in view of Mr. Morgan's remarks I feel that his letter should not be allowed to pass without a reply. It will be convenient to deal with your correspondent's arguments in the order they are raised by him.

(1) While I should be the last to assert the superiority of mere theoretical qualifications over hard earned experience, this does not alter the fact that no matter how brilliant a technician an E.P.E.A. member may be, membership of a trade union does not of itself confer

professional standing. The same point of course applies to accountants and secretaries.

(2) I maintain that the main function of the industry is the commercial sale of electricity and not electrical engineering. Presumably if Mr. Morgan were engaged in the retail brewery trade, he would feel the main function to be the installation and repair of beer engines, rather than that of selling beer !

(3) While admitting the remarkable progress of the industry in 40 years, it is not unquestionable that progress could not have been better, bearing in mind that the industry operates a quasi-monopoly. Again, the prudent commercial advice of many borough treasurers in the municipal sphere, together with the backing of the general rate fund in the early days of the industry, should not be overlooked. Does Mr. Morgan feel that the contemporary multiplicity of tariffs, the plug-top bugbear, or the necessity as recently as 1936 for a Government investigation into distribution matters, represent criteria of a good long-term commercial policy ?

(4) Apparently some electrical engineers assume that the technicalities of their work are far more abstruse than in any other industry, and that therefore the organisation of electricity supply can only connote technicians and analytical clerks. While the intricate details of generation and distribution are certainly a specialist's work, the broad engineering principles behind commercial policy are not so difficult to master, in fact, it is probably true that policy-making personnel—managers, councillors and company directorates—look more to their commercial staff for initiative than to their sectionally specialised engineers. All the impartial reviews of the industry that the writer has read stress the fallacy of subordinating the main commercial function to the engineering one, and in this respect I cannot do better than to quote from the Political and Economic Planning Report on Distribution published in 1936, *viz*:—

> " There is still a lack of commercially trained men and a lack of understanding that such men are specialists in their work on the same plane as engineers, and need to be adequately paid."

I would emphasise that I am not grinding an axe for the commercial direction of the electricity supply industry, but merely for recognition of the equal importance of the work of its commercial staff with that of the engineering staff. Administration depends largely upon personalities, but there seems little doubt that a commercially alive administrator who is also an engineer makes an ideal general manager.

Crewe. P. H. FLATT, B.Sc.(Econ.)

Linking Australian Power Systems

THE interconnection of the Sydney metropolitan power stations, and of the Port Kembla and Newcastle power systems with the Sydney metropolitan system, is being effected, states the *Australian Electrical Engineer and Merchandiser*. The proposals outlined by the State Electricity Advisory Committee in October, 1939, provided for the interconnection of the transmission systems of the Sydney County Council and the Electric Light and Power Supply Corporation, Ltd., at two points, *viz.*, Camperdown and Five Dock. The proposal also included an interconnection between the Balmain station of the Electric Light and Power Supply Corporation, Ltd., and the White Bay power station of the Railway Department. The work in connection with the linking of the Bunnerong and Balmain stations is well in hand.

Since the voltage of the Sydney County Council's transmission is 33 kV, and that of the company 22 kV, a coupling transformer will be required. This transformer will be a double wound unit rated at 15,000 kVA and it is understood that it will be the largest " on load " tap changing transformer manufactured in Australia to date. The " on site " weight will be 45 tons and oil capacity 3,600 gal.

An unusual feature of the coupling transformer is that it is designed to transfer full load in either direction. In order to provide for voltage regulation at the points of interconnection the transformers are designed for a tapping range of ± 15.7 per cent. Two units will be installed and these will be supplied by Australian General Electric Pty., Ltd.

When the tie between White Bay and Balmain is complete it will be necessary to install quadrature phase control so that proper supervision can be exercised over the transfer of power at the interconnectors.

The cable between the Balmain station and the Croydon Road and Camperdown interconnections is 0.35 sq. in. 3-core single wire armoured screened type, 22,000 V, supplied by Enfield Cable Works (A'sia Pty., Ltd.).

I.E.E. Installations Section

The inaugural meeting of the Installations Section of the Institution of Electrical Engineers will be held on September 18th, at the Institution, Savoy Place, Victoria Embankment, W.C.2, at 6 p.m., when Mr. H. T. Young, the chairman, will deliver an address which will be followed by a paper by Mr. R. Grierson on " Space Heating by means of Electrically Warmed Floors as applied to Surface-type Air-raid Shelters."

Corrosion in Electrical Machinery

By W. Subak

Various causes of corrosion are considered—atmospheric, dampness and electrolytic—and the author describes preventive measures including the use of protective coatings, resistant materials and proper design to afford ventilation and drainage

PROTECTION of a machine from the influence of moisture, acid gases, sulphur compounds and the like by means of coating them with varnishes and the maintenance of the external surfaces, even after a considerable lapse of time, present no difficulties. More difficult, however, is the protection of the inner faces, especially when the machine is continuously subject to a contaminated atmosphere.

In such instances, where the machine is of the normal open type, it is necessary to apply a particularly effective coating on the inner side. Among more modern machines for the chemical industry two types have proved most efficient, viz., those with cast-iron casings and those with welded casings of rolled steel.

Ventilation and Drainage

Under very severe conditions the only solution is to use totally enclosed machines. Pipe or duct ventilation is necessary to ensure the protection of the active parts of the machine, because even totally enclosed machines are seldom completely air-tight and may permit of a corrosive atmosphere penetrating to the machine.

Drainage holes should be provided to prevent the accumulation of water due to condensation. It is, however, worth while to avoid the formation of moisture on large machines by heating them with elements fitted in the lower parts, even when the machine is standing.

Typical of damage to bearings with sliding friction is corrosion of the shaft ends and of the brasses, which may be attributed to the presence of electric currents in the bearings. The magnetic path not being absolutely symmetrical, there arise variations of flux which cause potential differences in the system shaft-bearing-pedestal-bearing-shaft.

The current induced flows inside the bearing from the shaft across the oil to the brasses. Now it must be realised that inside the bearing there are two electrodes: the shaft end and the brasses, and as luck will have it the oil performs the function of an electrolyte. Interruption of this electric circuit will eliminate any danger for the bearing, and this may be secured by isolating one of the bearings from the pedestal.

It is not such an easy matter to minimise the effect of an alternating magnetic flux in the shaft created by certain connections in three-phase machines or the constant magnetisation of the shaft of some DC compound-wound machines. Thus voltages are induced in the shaft just as in unipolar machines.

Reducing Disturbing Flux

The effect of the currents caused is similar to that in bearings, but being generated by induction inside the bearing the currents cannot be interrupted. The only thing to be done is to reduce the disturbing flux as far as possible, and this may be achieved by disposing non-magnetic elements in the system shaft-bearing-pedestal.

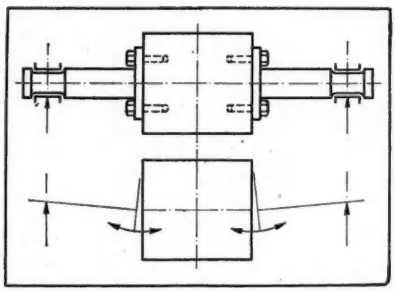


Fig. 1.—Alternating bending load on machine shaft

It has been found useful to connect the shaft with the casing with the aid of a copper-gauze brush. The use of short-circuit rings on the front of the stator windings and round the bearing pedestal of three-phase machines is another method of damping parasitic alternating flux.

Fatigue test of materials shows that a very

significant part is played by corrosion. Somewhat surprisingly it has been found that corrosion caused by water or brine reduces the resistance of stainless steel to a greater extent even than a rather roughly machined surface. The most likely explanation is that the outer stratum of stainless steel has lost its toughness and resilience.

Fatigue resulting from corrosion may be inhibited by the application of coverings such as non-ferrous metals, rubber and synthetic materials. Good results may also be obtained by painting, anodic oxidation, and galvanising. It is noteworthy that nickel plating or chromium plating afford no appreciable protection. Fortunately, but few parts of electrical machines are exposed to alternating forces and simultaneously affected by corroding chemicals, since the rotating parts are subject to centrifugal forces which exercise stress in one direction only. There remains the shaft, which is subject to alternating bending load, and the screws of some armatures, which in some models connect the shaft ends with the armature by flanges (fig. 1).

Screws are by reason of their position in the interior of the machine less exposed to corrosion. Nevertheless, it is advisable to protect them by means of cadmium plating in order to counter the ill effects of damp air. Damage to armature shafts does not occur and the protective paint of the free shaft appears to be sufficient to prevent corrosion by damp air.

Formerly all screws on ships were made of best bronze in order to secure their removal. Screws made of steel and cadmium plated have the double advantage of being less costly and of possessing greater strength.

Active parts of the electrical machine, since they carry current or are the medium of the magnetic circuit, require the most effective protection against corrosion. A relatively small fault may cause a breakdown.

Synthetic Resin Varnishes

In order to reduce iron losses the sheets of the core are insulated from each other. More effective than paper insulation is the use of varnish on both sides, which secures satisfactory resistance in machines subjected to great heat. The chemical industry has provided us with a whole range of synthetic resin varnishes offering complete resistance to the influence of water, heat, acids, lyes, etc.

The most effective varnishes are those made of phenol and its derivatives which are oven dried at a temperature of about 180 to 200 deg. C., for air dried varnishes can only be used under less severe conditions where paper insulation would fulfil the same purpose. Much is demanded of varnishes employed in oil-cooled transformers, as they must be oil resistant and should not affect the oil.

Varnish may be applied by painting, spraying or dipping. The essential properties of a good insulating varnish for cores are as follows: It must adhere well to the sheet, withstand chemical influence, refrain from splintering when the sheet is punched and display an even distribution in case of dipping.

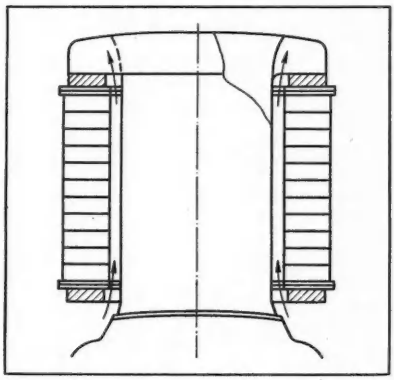


Fig. 2.—Ventilated pole winding of a synchronous machine

Danger to windings from corrosion may arise chiefly from destruction of the insulation by acids, water, vibration and so on, but the varnish protecting the insulation is nowadays of an extraordinarily high standard and some results of a test may serve to illustrate this.

A coil immersed in sea water for 3,860 hours was subjected to a voltage of 5,000 and subsequently 8,600 hours without voltage being applied. On removal it was subjected to a final voltage of 5,000, the insulation being unaffected.

Dangers of Condensation

This test proves that varnishes are available which resist extraordinary stresses, but some windings are not provided with the necessary insulation against accidental wetting and must be carefully dried before the machine is again put in action. The appearance of condensation, therefore, constitutes a grave danger to windings equipped only with normal insulation.

Cases have been known in which drips due to condensation from an oil-pipe softened the insulation of the end windings causing flash-over. The formation of mist inside water-cooled machines, owing to a lowering of temperature of the cooling water, has caused short-circuits, giving rise to burning of the coil heads. Accidents like these are not strictly connected with corrosion, but they prove how dangerous the appearance of water inside a machine may be.

Further danger may be caused in high-voltage machines by the difference in voltage

between individual coils giving rise to glow-discharge which decomposes the damp air. Thus nitric acid is formed which affects the normal insulation. Glow discharge may be countered by painting the windings inside the slots with conducting varnish.

Disturbance may be caused by verdigris on impregnated windings. The causes of this are: Fungus on the covering of the wire after storage in damp air; perspiration from the armature winding or salty grease coming into contact with the insulation; leaving the impregnated coils too long in damp air before drying in the oven; too high an acid content of the insulating varnish; discharges in the slots of high-voltage machines during working leading to the production of ozone and, if dampness is present, of nitrous acid; the surface of the copper conductors acting as a catalyst for the absorbing of oxygen into the oil contained in the varnish (the proportion of acid in the oil being probably increased by absorption of moisture and oxygen).

The avoidance of these difficulties must be considered in the construction of the machine. The production of nitric acid and nitrous acid may be prevented by impregnating the windings with appropriate chemical substances, *i.e.*, organic bases such as diphenilamin or its solutions.

Condensation may be countered by suitable design, and particular attention must be paid to the mechanical design of the windings. Especial care must be given to machines working in damp rooms, as, for instance, synchronous machines coupled to water turbines or used for propelling ships. Here the designer must provide for effective ventilation. Fig. 2 illustrates a design of a ventilated pole winding of a synchronous machine. It is also essential that no pipes carrying cold oil or water are in juxtaposition to the windings.

More exposed to corrosion than parts protected by insulation are the bare parts such as brush strands and slip rings. If the atmosphere contains sulphide of hydrogen the brush strands are particularly liable to corrosion, for the great number of thin wires of which the strand is composed offers an extensive surface for chemical reaction.

The use of flexible copper straps instead of strands temporarily provides greater resistance to corrosion, but after a certain period they become hard and brittle when affected by sulphur. The best results are obtained by using strands provided with efficient protection. The tinning of each individual wire seems unduly complicated, but has been found to be very satisfactory.

Among the light alloys used in electrical machines the most widely employed are those of the aluminium-silicium group, which are noteworthy for their great resistance to corrosion. Magnesium alloys acquire greater circumspection in their use, since with combinations of magnesium with heavy metals electrolytic corrosion occurs when an electrolyte is present (*e.g.*, the dampness of the air may act as such). This phenomenon is comprehensible when the potential difference is considered, which for magnesium and iron is 1.12 V.

Several kinds of damage may occur in windings and bearings which require especial protective measures. When electrical machines are destined to work in damp atmospheres or in chemical factories this must be borne in mind in its relation to design and ventilation. In designing the machine consideration must be given to the protection required for light alloys.

Skilled Men for the Forces

A CONSIDERABLE "comb-out" of skilled men in civilian employment is foreshadowed in an interim report by Sir William Beveridge's Committee on Skilled Men in the Forces issued last week as a White Paper. (Stationery Office. Cmd. 6307, price 2d.)

After dealing with the arrangements for training men already in the Forces as mechanics, the Committee says that so far the Services have been able to meet their needs for skilled supervision very largely by men trained before the war. But the number of these men is limited and the training necessary to equip others is long. There is a danger that the machines on which the lives of fighting men and the safety of the country depend may have to be entrusted to insufficiently skilled men working under inadequate supervision. The Committee considers that the modification, repair and maintenance of war equipment is being performed at present with a notable economy of skilled men secured by a high degree of "dilution" and extensive and well-conceived training. Also, vigorous efforts are being made to discover men already in the Services whose qualifications are such that they could undertake skilled work or be trained to do so. But the needs are increasing at such a pace that these sources of men are becoming insufficient.

Consequently it becomes necessary to consider a further substantial withdrawal of skilled men from civilian employment to the Services; this should be met by a corresponding extension of dilution in civilian industry. Taking as basis the requirements already submitted by the Service departments for fully skilled men from industry, in engineering and allied occupations (other than radio mechanics), as from June 1st to December 31st, 1941, the Committee suggests that of these requirements 50 per cent. in the case of the Army and of the Navy and 60 per cent. in the case of the Air Force should now be admitted on account and that arrangements should be made to provide these numbers by November 1st, 1941, without prejudice to any further allocation in the light of the definite report which it is hoped to present about the end of September.

Requirements in Canada

Some Guidance for British Manufacturers

By E. Arthur Pinto,
A.M.I.E.E., M.E.I.C.

IN the ELECTRICAL REVIEW of August 22nd, I gave some general indications of a number of pitfalls into which British manufacturers fall with disastrous results to their sales efforts in Canada. In this article it is proposed to point the morals of these and to indicate the lines on which home manufacturers should plan their post-war campaigns. We have seen that on the question of cost, the burden of freight and insurance is considerably modified and sometimes entirely offset by the preferential customs charges on goods of United Kingdom origin over those of other countries. Here, therefore, the conditions are certainly not against the British seller.

The next point, however, is one which is undoubtedly the most serious obstacle to an increase of British trade in this country, namely, the geographical proximity of the United States and all that this involves, but it is easy to overestimate the importance of this, because distances on this side are much greater than those to which Englishmen are accustomed at home, and it must not be thought that by any means all the manufacturing and industrial areas of the vast United States are only a few hours' journey from Canada. Such is by no means the case, so British firms should not shield themselves behind this screen of inaccessibility. They must regard it merely as one of those concomitants of trading conditions which must be tackled as is any other production or commercial problem.

This leads up to one of the most widespread criticisms of British methods which one hears almost daily and from all types of Canadians; one, moreover, which does not refer to engineers only—it is a criticism levelled at English traders generally. Too often one is told that an English firm grudges any special expenditure even though it may obtain an order and will in any case gain the goodwill of a possible client. The American representative will, without a moment's hesitation, use the long-distance telephone to his firm to obtain some desired information and this often costs as much as a cable or night-letter cable to England. The British representative in such cases offers to *write* to England and even in peacetime he is fortunate if he receives a reply in three weeks, compared with his American competitior's few hours.

Having previously pointed out some shortcomings of British manufacturers, the author gives helpful advice for remedying these and meeting Canadian conditions

Two agents of reputable English firms have told me the same tale—each time they cable to England they have to make a detailed report as to the necessity for such a course. Such cheese-paring will get them nowhere in these countries. Britons do not seem to have learned how to employ the advances of science—often their own work—to eliminate distances. Alongside this point is the one that American (including Canadian) business people realise more fully how often seemingly extravagant expenditure will result in financial gain. In the previous article mention was made of an order for special switchgear. The whole of this was delivered to Canada by "express" instead of by ordinary "freight" train. The cost of carriage alone was upwards of $1,200, as compared with $500 by the cheaper route, but the contractor calculates that he saved $1,000 by avoiding wasted time.

To sum up the matter of salesmanship or representation and what it involves, the British manufacturer who wishes to secure his share of Canadian post-war trade (or even wartime trade) will do well to ponder the following points and to ask himself whether they do not suggest considerable room for improvement in the methods he has hitherto adopted:—

Representation.—First and foremost, the selection of an agent or representative requires the most astute and careful attention. In a country such as Canada it is not the slightest use selecting the man who tells the best "tale" in his letter of application. Inquiries must be made on the spot as to his reputation and knowledge of his trade no less than as to his being a man of substance and with a background which will bear investigation. A man who has not had engineering experience in Canada will be at a great disadvantage for a long time, owing to the many differences in standards, gradings, regulations, and so on; but though this may cause initial delay in producing results, it is not insuperable and the otherwise suitable representative will soon accustom himself to the new conditions.

It is almost equally important that as high an official as possible, preferably the head of the firm (if he is an engineer) should pay personal visits to his representative as well as to leading customers or prospects as often as

possible. The cost will soon be recovered. Nowhere is the method of personal approach practised more fully and more successfully than in Canada, but it cannot be emphasised too much that the approach must be by the right man. Further advantages of such visits will be the opportunity of judging whether special designs for this market are advisable and whether stocks of lines suitable for this country should be carried in Canada. Where the latter course is at all possible, it is more likely to lead to business than is anything else the British manufacturer can do. In fact every possible means—and there are many—for affording quick deliveries must be employed.

Technical Literature and Catalogues

Trading Equipment.—Elaborate office accommodation is not called for, but a centrally-situated depot should be well stocked with full supplies of technical literature as well as catalogues. In the latter respect Canadian and American manufacturers are infinitely better equipped than even the largest British manufacturers and their catalogues are often marvellous productions, whether regarded as price lists, technical textbooks, or merely as examples of the printer's art. A well-known firm of English manufacturers who have achieved considerable success in the United States and Canada produce catalogues specially for these markets which are considerably in advance of their own English catalogues. This firm, at least, has learned this valuable lesson.

Here are also a few specialised items which require the attention of English manufacturers. This list is by no means exhaustive and it is hoped at a later date to publish similar notes on other branches of the industry, but it may be taken also as a guide as to those manufactures for which the Canadian market presents a good opening to Britain.

Motors and Transformers.—There are considerably more voltages in common use in Canada than in England and these voltages are mostly of different values from English, but space cannot be found for all. Transmission pressures vary from 66,000 to 2,200 V. Power supplies in industrial plants include 2,200, 500 and 220 V and three-phase transformers and motors are required for all these. Domestic supplies are mostly about 110 V for lighting and 220 V for power, the midpoint being earthed in both cases. The standard frequency is 60 cycles, but the very important province of Ontario is supplied by its Hydro-Electric Power Commission at 25 cycles. These are important pointers for manufacturers of motors and transformers and designs must be adapted accordingly. More attention should be paid to the requirements as regards the terminal blocks and connections of motors. Present types cause much annoyance here, where standard American practice is followed.

Motor Starters, etc.—Motor control has received very elaborate study in the United States and some extremely complicated systems have been evolved. These are aimed solely at satisfying the requirements of each individual drive and thus there is possibly less standardisation than in England. Further examination of these problems should well repay British manufacturers of motors and control gear, particularly as regards the use of high-voltage motors. English standard fusing arrangements are not suitable here. Particular attention should be paid to the American National Electric Code requirements in these matters.

Switchgear.—The earthed neutral is general and should be provided for. On the better industrial plants "no-fuse" circuit-breakers are becoming increasingly popular, even to as low capacities as 15 A. E.h.v. switchgear follows British practice to a great extent. This is because English manufacturers have probably gained a better foothold here than in any other direction, but there is ample room for extension.

Cables and Wires.—These differ very considerably from British standards as regards types, insulation, rated capacities, etc. The range is larger and more complicated and more use is made of solid wires in preference to stranded. On the whole this branch of manufacture appears to hold out a less favourable prospect of new business than any other, unless the manufacturer is prepared to put on the market what to him would be an almost entirely new range of goods.

Conduits and Installation Supplies.—Very special attention should be paid to standard conduit threads, and to the rating of large and small switchgear, fuses, etc. All these are entirely different from British standards which are neither understood nor required here. There is a much larger range of conduit accessories in use than in England. The index alone to one conduit accessories catalogue is bulkier than the whole of the largest English catalogue of this material.

Domestic Lighting Accessories are of very inferior quality and design as compared with English standards. This applies to insulation, capacity and general appearance. Most of these are reminiscent of the old low-voltage types in use in England thirty years ago. The Edison-screw type of lampholder and the flat-contact socket and plug (known as "receptacles") are universal.

Climate and Regulations

Winter conditions are not likely to affect British manufacturers to any considerable extent, except as regards open-air substations and icing on transmission lines, but the effect of the high degree of humidity experienced in summer in some parts of the country must be carefully considered where the use of presspahn or any other hygroscopic insulation is contemplated.

As regards regulations, to a great extent the American National Electric Code is followed. There are, however, various provincial codes

as well as the Canadian Electrical Code which is issued by the Canadian Engineering Standards Association. These appear to combine the functions of the I.E.E. and Home Office Regulations as well as, to a certain extent, the British Standard Specifications. Most equipment is, moreover, subject to the approval of one or other of various standardisation authorities, that most widely recognised in Canada being the Hydro-Electric Power Commission of Ontario. Even such simple articles as flexible wire-plug assemblies for small domestic appliances, as sold in chain stores, bear a standardisation or approval tag attached to each individual assembly. The question of regulations, however, covers so wide a field that any British manufacturer who intends to market his products in Canada should get into touch with the Canadian Engineering Standards Association at Ottawa for advice.

Water-Power *and the* War

Utilising Ontario's Resources for Industry

IN both the industrial and agricultural spheres Canada is largely dependent upon its water-power resources, in the development of which it is one of the leading countries of the world. This is particularly apparent in the case of Ontario, the chief industrial province of the Dominion as well as the one with the largest agricultural production. There, the steps which are being taken to provide the maximum aid for our war effort are clearly reflected in the operations of the Hydro-electric Power Commission, whose report for the year ended October 31st, 1940, has recently been published.

Reviewing the Commission's activities, Dr. T. H. Hogg, the chairman and chief engineer, says that in all departments first place has been given to the task of ensuring that there should be ample supplies of power available for the war industries wherever and whenever needed. The beginning of the year found the Commission in a favourable position and the promise then made that it could meet a greatly increased demand for war requirements has been kept without undue difficulty. The total output of energy for primary purposes was 7,838 million kWh, which was by far the largest amount delivered in any year, and exceeded the 1939 output by 19 per cent. In addition, the Commission utilised its reserve capacity to produce a further 1,850 million kWh for secondary power purposes, and much of this was employed in the manufacture of war materials.

Again, as for several years past, a remarkable growth in load took place in the mining fields. The total primary peak load of Northern Ontario Properties in October last reached 202,000 HP, compared with 168,000 HP in October, 1939, and by December it had risen to 205,000 HP. These properties, which cover an extensive area north of Lake Nipissing and the French River, are held in trust and operated by the Commission on behalf of the province. They involve a power supply to 51 mining enterprises, two cities, four towns and ten villages, hamlets and mining townships, as well as to the Canada Northern Power Corporation.

With regard to the co-operative municpa systems, in which electrical service is given by the Commission to municipalities and by them to the ultimate consumers at cost, the greater

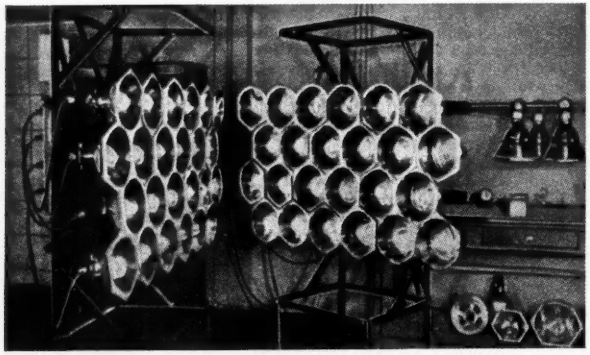
The Commission's headquarters at Toronto, showing the addition of ten storeys which completes the new building

part of the increase in primary load was centred in the Niagara system, and arose largely from the expanded demands of the electro-metallurgical and electro-chemical industries in the production of war material. Very little trouble

was experienced from ice conditions in the Niagara River, although on one occasion the formation of a large ice jam in the lower river resulted in a reduction in the output of the Ontario plant to the extent of some 25,000 HP for most of one day, and assistance was given to the Niagara Hudson Power Corporation for four days when the output of the Schoelkopf plant was reduced by ice at the intake. In many other instances the interconnection of networks has proved of considerable advantage.

The year 1940 completed a period of two decades during which the Commission has carried out rural development through what are known as "rural power districts," the limits of which depend upon the economic distance which may be served from a distribution centre. The land area of the province extends over 363,282 square miles, of which about 35,700 square miles are occupied for agriculture. There are 184 operating rural power districts, with about 123,000 consumers, served by 19,492 miles of rural primary lines. During the year 9,865 new consumers were connected, and the construction of 1,340 miles of rural line extensions was approved.

The heavy demand for additional electrical service during the year necessitated an amount of engineering and administrative work unprecedented in the Commission's history. The extension of the Ear Falls development in northern Ontario was completed in June last year, and work was commenced on the Big Eddy development on the Musquash River, for the Georgian Bay system. The site is four miles below the Ragged Rapids generating station brought into service in 1938, and the plant, rated at 10,000 HP under a head of 36 ft., is expected to come into operation in November next. In the Eastern Ontario system, plant with a capacity of 56,000 HP under a head of 154 ft. is to be completed at Barrett Chute, on the Madawaska River, by next year.



Apparatus for drying by infra-red radiation

One of the most important actions taken during the year for increasing Ontario's power supplies was the arrangement made with the United States whereby Canada is enabled to utilise immediately for the increase of output at Niagara for war purposes an additional flow of water equivalent to that which will be added to the Great Lakes as a result of diverting water from parts of the Albany River watershed. The diversions into the Great Lakes from Northern Ontario have a bearing on the much larger St. Lawrence navigation and power project, which is now linked with the steps being taken by the United States and Canada for the defence of the Americas.

A considerable amount of research work was carried out at the Commission's laboratories and several interesting items of testing equipment were added during the year, including infra-red radiation equipment for drying paints and textiles. In this, banks of tungsten lamps with special gold-plated reflectors are arranged in ovens or tunnels.

An important step taken during the year in connection with the approval of electrical equipment was the assumption of responsibility for this by the Canadian Engineering Standards Association. The Commission organised its own approvals laboratory in the year 1918, and with the appearance of the first edition of the Canadian Electrical Code in 1927 its activities were considerably expanded. For the past ten years it has undertaken work in all parts of Canada and also for United States manufacturers.

The electrical inspection department's report shows that there were five cases of fatal electric shock during the year, two of the victims being children who touched brass lampholders and three were electricians. Twelve fires were found to be due to electrical causes. Under the regulations governing the installation or sale of equipment there were 42 prosecutions.

The financial section of the report records that additional capital expenditure to the extent of £11,188,000 was incurred during the year compared with £9,137,000 in the previous year. Aggregate capital expenditure to date was £449,038,000, and reserves totalled £232,644,000. Revenue from the co-operative systems and rural power districts amounted to £37,399,000, and there was a net surplus of £404,162. From the Northern Ontario Properties there was a net surplus of £1,038,395.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Valve Voltmeters

TWO freshly designed thermionic-valve voltmeters have recently been put into production by SALFORD ELECTRICAL INSTRUMENTS, LTD., Silk Street, Salford, 3, Lancs. Type BW.211 has been introduced for general laboratory measurements at frequencies between 20 cycles and 200 Mc/s. It is suitable for use on AC 200/250 V mains without adjustment and has five ranges of 0/1.5, 0/5, 0/15, 0/50 and 0/150 V respectively, on all of which the accuracy is within ± 2 per cent. of the full scale reading.

Mains-operated valve voltmeter, showing explorer prongs. Above is a simpler valve voltmeter, dry-cell operated

The signal to be measured is applied to a diode rectifier which has a high load resistance, so that the input condenser is charged to a negative voltage almost equal to the peak voltage of the signal. This voltage is passed on to a DC amplifier which has a regenerative action. The detecting diode is contained in a small head attached to the instrument by a flexible cable, thus enabling it to be moved directly to the point at which the signal is to be measured.

Type BW.218 is intended to satisfy the needs of users requiring a simpler meter to operate over a more limited frequency band. It has three ranges—0/5 and 0/25 and 0/100 V—and is battery operated to make it entirely self-contained. The knife-edge pointer moves over an edgewise long scale, the pivots of the instrument being normally in a vertical direction to ensure accuracy. At the back is a special ceramic "low loss" high-frequency terminal and a removable finger button to permit the insertion of the 3-V torch battery which energises the voltmeter. Both models are enclosed in substantial walnut cases.

Soldering Devices

Soldering irons of the 450-W and 600-W industrial sizes for medium work, of the "Vici" brand formerly imported from Sweden, are now being manufactured at the works of T. LEEMAN, 34, Palmerston Road, South Acton, London, W.3. Lighter models of 80, 100 and 130-W loadings are also available for telephone and wireless work. All these irons are obtainable for up to 250 V, and their heating elements are renewable.

The variety of bench type soldering tools, including foot-operated models, made by STANELCO PRODUCTS, Ferndown, Northwood Hills, Middlesex, are designed for speedy electrode arm heating and the soft or hard soldering of multitudinous parts with the aid of variously shaped pencils, forks, jaws and clamps. A range of five portable transformers is also available with interchangeable couplings for energising hand soldering tools. They have two-core and earth primary leads with two-heat switches, outputs ranging from 100 to 2,500 W.

Heated Sirens

Apart from bells, works hooters, fire alarms, with associated relay and contactor control gear, a variety of sirens is made by CARTER & CO., LTD., William Street, Nelson, Lancs., for hand and belt driving, a 12-V model for vehicles and a mains-operated range approved by the Home Office for A.R.P. requirements. The latter are double-ended horizontal and single vertical types of from 0.5 to 20 HP, their driving motors being specially designed for the purpose. The rotors are machined one-piece aluminium castings mounted directly on the shaft and dynamically balanced in ball bearings to ensure quick pick-up of speed.

To keep the sound-boxes free from snow and ice electric heaters are available, which avoid the risk of the motor burning out should it be switched on when the sound rotors are locked by freezing. The heaters are tubular, their elements being sheathed in cupro-nickel, arranged in the form of a flat ring to which a conduit terminal box is attached. The whole is weatherproof and drilled ready to be easily fitted in place of the existing end-cover of the sound box. The rating depends on the size of the motor, two 1-kW heaters being supplied for a 5-HP twin siren, with thermostatic temperature control.

In addition to two- and three-note sirens, with push-button wailing, stator mechanism can be added for actuation by lanyard, or remotely by solenoid over telephone lines, which permits Morse code signalling.

Industrial Welfare Conference

The Industrial Welfare Society is holding a conference at Reading University from September 5th to 7th, when many present and post-war problems will be reviewed.

Post-War Sales Policy

Future of Supply Undertakings' Staffs

By H. C. Arthur

THOSE members of the electricity supply industry now serving in the Forces spend much of their spare time discussing among themselves their likely future when this war is won. There is also a large body of men who have taken the places of those who have joined the Services who are also thinking a great deal about their future after the war.

Electricity supply men now in the Forces are worrying, not so much as to whether their jobs are still there, but about the prospects of promotion, for it must be remembered that the war has now been in progress for two years, and in normal circumstances those men would have had two annual increases in their pay.

Many of these young electrical engineers are holding quite good positions in the Services and their pay as army captains, naval lieutenants, or perhaps R.A.F. squadron leaders is more than they earned in peacetime. On the other hand there are electrical men formerly employed in the sales and development departments who are earning less in the Services than they did in their civilian occupations.

Increased Responsibilities

As a result of the war many men have married at an earlier age than they would have done normally, and whereas the Services provide marriage allowances, electricity undertakings do not, of course, make a similar allowance. The majority of electricity supply undertakings have been generous and have made up the salary of their employees to their peacetime level. A few have been more than generous and have paid their employees their full salary in addition to Service pay. Generally speaking electricity supply men on active service have not suffered financially up to now, but in many cases their expenses have increased. Consequently they will tend to expect reasonably rapid promotion after the war, and they probably feel that it is up to those left behind to organise things so that there should be ample prospects for promotion when hostilities cease.

Temporary Employees

The case of the men who are temporarily taking the place of men on active service is different. If the industry finds that it has to dispense with them entirely after the war they will be thrown out of employment at a time when there will probably be a surplus of men and a minimum of jobs. How can the electricity supply industry absorb these men? The answer is fairly obvious—by expanding. If those in authority plan for post-war development there should be ample room for the rapid expansion of the sales and development departments and many of these temporary employees could be absorbed.

It is obvious that after the war the Government and local authorities will have to embark upon a rapid rebuilding programme to house the many families who have lost their homes. It therefore follows that if the supply industry wishes these homes to be totally or nearly "all-electric" a mass selling campaign will have to be introduced as soon as the war is over. Men will be required to call upon architects, builders, house agents, and women's organisations with suggestions and plans for modern labour-saving homes embodying the latest electrical appliances.

The Manufacturers' Part

In this connection it is to be hoped that the electrical appliance manufacturers will realise that they will have little time in which to produce all the equipment required. Rather than waiting until the end of the war, therefore, they should improve the design and appearance of their appliances, and, having agreed upon the most suitable design, standardise their equipment as much as possible. As to the supply undertakings, it is to be hoped that they will assist the consumer by simplifying their tariffs as much as possible. Those employees in the Forces and those men in temporary appointments, on their part, will have to keep abreast of new developments and, as has been pointed out by other correspondents, trade journals, and particularly the ELECTRICAL REVIEW, are of considerable assistance in this connection.

Science and Social Problems

IN "The Scientific Attitude" (Penguin Books, price 6d.) Mr. C. H. Waddington, from his work as a research scientist specialising in matters appertaining to evolution, outlines in an attractive fashion the reasons for his belief that the solution of the problems of mankind, social, cultural, political and economic, can be found only by means of a scientific approach. A realistic picture is painted of present-day conditions of life and the way they have developed, and fallacies of the so-called ideologies are exposed. How science can help to bring about a happier state of affairs than exists to-day forms interesting reading.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE British Empire Medal has been awarded for bravery during air raids to **Mr. F. A. Eastes,** stoker, Hastings Corporation Electricity Department, and **Mr. F. Payne,** mechanic in charge, grade II, Engineering Department, Post Office, Liverpool.

The Export Credits Guarantee Department announces that **Mr. A. L. Trump,** who has for some years been district manager at the Birmingham office, has been appointed district manager at the Department's Bradford branch, and will take up his duties on September 8th. **Mr. E. Edwards** has been appointed branch manager at the Department's Birmingham office with effect from September 1st.

Mr. **C. Clarke,** general manager of the Birkenhead Transport Department, who was due to retire on superannuation, has been re-engaged in a temporary capacity at a salary of £1,000 per annum.

Mr. **McNeely Du Bose** (Saguenay Power Co.) has been elected president of the Canadian Electrical Association in succession to Mr. G. A. Gaherty (Montreal Engineering Co.)

Mr. **A. J. Hastings,** deputy electrical engineer, Great Yarmouth Corporation Electricity Department, is retiring at the end of this month on account of ill-health.

Mr. **H. Topley,** power station superintendent with the Halifax Corporation, has been appointed to a similar position at Derby.

The Commander of "R" Zone, Home Guard, **Lieut.-Gen. Sir Douglas Brownrigg,** K.C.B., D.S.O., carried out a general inspection of the factory Home Guard unit of Johnson & Phillips, Ltd., 23rd County of London Battalion, "E" Company, on August 25th. The General was accompanied by Lieut.-Col. B. C. Bennett, Commander of the 23rd County of London Battalion, and Capt. Lowndes, "R" Zone Intelligence Officer. The J. & P. unit comprises four platoons, two from the day shift and two from the night. The C.O. is Capt. H. D. Parsons, and the platoon officers are Lieuts. Crichton, Sawyer, Wooldridge and Russell.

In an address to the men after the parade, Lieut.-Gen. Sir Douglas Brownrigg expressed his congratulations to the unit. He was afterwards conducted round the works, when an opportunity was afforded of seeing the J. & P. Home Guards at their work, ready to go to their posts should an emergency arise.

Mrs. M. L. Matthews, A.I.E.E., whose retirement from the Consolidated Pneumatic Tool Co., Ltd., we announced in our last issue, has been in the service of the company for twenty-eight years. She was at first private secretary to the late Mr. F. D. Johnson, M.I.Mech.E., then managing director, and later was private secretary to Mr. A. Stewart, M.I.E.E., who was managing the Electric Tool Department. When, in 1919, Mr. Stewart became a director Mrs. Matthews took charge of the commercial development of the company's electric tool business.

Mrs. M. L. Matthews

Among other activities Mrs. Matthews has been a member of the Council of the Women's Engineering Society and served as vice-president. In 1923 she read a paper before the Society on "A Scheme for Popularising the Domestic Uses of Electricity." At a later meeting of the Women's Engineering Society the following resolution was passed:—"That this meeting, realising the need to interest women in electrical development in this country, decides to form a women's electrical association and wishes to put on record its thanks to Mrs. Matthews for the initial steps in contributing her paper on the subject." Thus was evolved the Electrical Association for Women, of which Mrs. Matthews was vice-president for some years.

Members of the J. & P. unit of the Home Guard awaiting inspection by Lieut.-Gen. Sir Douglas Brownrigg

She was at one time a member of the London Local Advisory Committee of the E.I.B.A. and, in collaboration with Mrs. Ll. B. Atkinson, did valuable work.

To mark her retirement from the Consolidated Pneumatic Tool Co. a ceremony took place recently in the company's board room at Fraserburgh, when Mrs. Matthews was presented with a gold wrist watch and a cheque, on behalf of the directors and staff.

Mr. James W. Parker, vice-president in charge of engineering to the Detroit Edison Co., has been nominated for the presidency of the American Society of Mechanical Engineers.

In announcing the appointment of **Mr. T. H. Carr,** as deputy electrical engineer and manager of the Bradford Corporation Electricity Department in a recent issue, we stated that he was at one time chief constructional engineer with the Sheffield Corporation Electricity Department. This was incorrect, as Mr. Carr joined the Sheffield Electricity Department as assistant to Mr. A. E. Brook, A.M.Inst.Struct.E., A.M.Am.Soc.C.E., who is construction engineer with the Sheffield Electricity Department.

Mr. J. Rankin, F.C.I.S., a director and the secretary of the North Wales Power Co., Ltd., and Electricity Distribution of North Wales and District, Ltd., has been appointed general manager of those companies. Mr. Rankin is also secretary of the British Power & Light Corporation, Ltd., and its other subsidiary companies.

Mr. B. Jones, A.I.Mech.E., A.I.E.E., of Burnley, was married last week to Miss Marjorie Fielden, The bridegroom is charge engineer with the Lancashire Electric Power Co., Padiham.

Mr. and Mrs. C. G. Tegetmeier, now living at No. 5, The Drive, Coulsdon, Surrey, celebrated their diamond wedding on September 3rd. Mr. Tegetmeier has had a long association with the electrical industry and is still a director of the Northmet Power Co.

Mr. D. J. Nolan, assistant general manager of the Sydney County Council electricity undertaking, has accepted an invitation to become managing director of the Clyde Engineering Co. Ltd., Granville, N.S.W., which is engaged in important work for the Commonwealth Government. Mr. Nolan has been granted, provisionally, twelve months' leave of absence by the County Council. He commenced his new duties on May 12th.

Obituary

Dr. R. D. Archibald.—We regret to learn of the death, which occurred on August 17th, of Dr. Robert Douglas Archibald, D.Sc., M.I.E.E., A.M.Inst.C.E., who, until his recent retirement, was senior lecturer in electrical engineering at the Royal Naval Engineering College, Keyham. Dr. Archibald had held this position for eighteen years.

Brig.-General C. H. Mitchell.—The death occurred in Toronto, on August 26th, of Brigadier-General Charles Hamilton Mitchell. According to the Toronto correspondent of *The Times*, Brig-General Mitchell was born in 1872 and was educated at Toronto University and qualified as a civil engineer. From 1894 to 1901 he was city engineer, Niagara Falls, and from 1901 to 1905 was assistant engineer to the Ontario Power Co., of Niagara Falls. Since 1906 he had been consulting engineer on many Canadian hydro-electric schemes, and had been employed by the Government of Canada and by the Governments of Canadian provinces on water power. In 1924 he was appointed by the Canadian Government to the International Joint Board of Engineers on the St. Lawrence waterway project. He was president of the Engineering Institute of Canada in 1929, and from 1927 to 1933 he was president of the Toronto Board of Trade. Brig.-General Mitchell was a member of the Institution of Civil Engineers and a member of the American Society of Civil Engineers, and held the honorary degrees of LL.D. and D.Eng. He was awarded the D.S.O. in 1916, was made C.M.G. in the following year and in 1918 was created C.B.

Mr. I. F. Groves.—The death occurred recently of Mr. Isaac Fifield Groves, founder and senior partner of the firm of I. Groves & Co., electrical contractors, Southampton. Mr. Groves commenced the business in 1909 and was one of the first electrical contractors in the town. He was a member of the Southampton branch of the Electrical Contractors' Association.

Wills.—Mr. Stanley Beeton, who was chairman of the Morgan Crucible Co., Ltd., left estate valued at £340,044 (net personalty £272,862). He made a number of charitable bequests.

Mr. Frederick Edward Kennard, M.A., B.Sc., M.I.E.E., a partner in the firm of McNamara & Kennard, consulting engineers, of Dublin, and lecturer in electrical engineering at Trinity College, Dublin, left personal estate in England and Eire, valued at £1,841.

Electricity in Sweden

THE annual report of the Swedish Waterfalls Board states that in spite of the abnormal conditions good results were achieved during 1940. The total consumption of electric power in the country amounted to 3,149.9 million kWh, an increase of 59 million kWh on 1939, or 1.9 per cent. The railways used an additional 101.3 million kWh and there was an increase of 212 million kWh in general consumption (for lighting and heating purposes, etc.) On the other hand there was a reduction in consumption for electro-chemical and electro-thermal purposes of 5.8 million kWh, and for other industries, such as the paper mills, mines and pulp-grinderies, a reduction of 293.4 million kWh.

The construction of new hydro-electric power stations and the enlargement of old ones has been speeded up owing to the war situation, which has rendered the importation of fuel from abroad difficult or almost impossible. Moreover, much construction has been undertaken in order to protect the power stations against possible attacks, especially from the air. In this respect most Swedish power stations are particularly favoured, because much of the plant is installed in caves blasted out of the mountainous banks of the waterfalls or rapids.

The surplus earnings in 1940 amounted to Kr. 24,870,000, which was Kr. 1,870,000 more than in 1939. This means a yield of 5.77 per cent. on the invested capital compared with 5.80 per cent. in 1939.

Electricity Supply Progress

Commissioners' Statistics for 1938-39

WE are informed by the Electricity Commissioners, whose public reports have been suspended for the period of the war, that at the end of the year 1938-39, the number of statutory electricity supply undertakings was 581. These possessed some 9,498,000 kW of generating plant, 584,000 kW more than for the previous twelve months. Included in this total was 238,000 kW of DC plant, which was increased by nearly 33,000 kW, this being a reversal of the normal tendency. About 4 million lb. per hour of boiler capacity had been added, bringing the aggregate to 106,587,000 lb.

The above plant generated 24,810 million kWh, an advance of 7.8 per cent. on 1937-38 as compared with 12.1 per cent. during the previous year. All but about one-tenth was generated under the directions of the Central Electricity Board. In addition 141 million kWh was purchased from outside sources which, with 68 million representing excess of inter-purchases over inter-sales, brought the total gross public supply up to 25,019 million kWh.

Although they appear rather late the figures given in this article help to preserve the continuity of the record of electrical development in this country

After deducting energy used on works (5.46 per cent.) and lost in distribution (11.43 per cent.), approximately 20,793 million kWh was sold to consumers in the various groups as follows (millions of kWh):—Lighting, heating and cooking, 8,341; power, 10,840; public lighting, 376; traction, 1,236.

The number of consumers was brought above the ten million mark to 10,101,000 (about two-thirds of whom were served by public authorities); this shows an improvement over 1937-38 of 7.94 per cent., but was not quite so good as the rate of advance in the preceding twelve months when it was 9.3 per cent.

Under the heading of capital expenditure, generation accounted for £180 million, main transmission £64 million (including £39 million by the C.E.B.) and distribution £315 million. Other items included in the total of £648 million (£39 million in excess of the previous year) were apparatus on consumers' premises (£50 million) and frequency standardisation (£17 million).

Of the revenue from working, amounting to £98.5 million, 56.66 per cent. was received from lighting, heating and cooking consumers, 30.42 per cent. from power consumers, 1.66 per cent. from public lighting and 3.06 per cent. from traction; the balance of 8.5 per cent. included rentals for meters, apparatus and wiring and profit on sales of fittings. Working expenses (excluding capital charges) reached £54 million, of which £19.5 million was for generation and £1.8 million for energy purchased from outside sources, giving an average cost of energy (omitting inter-purchases) of 0.246d., or 39.58 per cent. of the average cost per kWh sold, *viz.*, 0.627d. (0.614d. in 1937-38).

Approximately £7.3 million in working expenditure was incurred in transmission and distribution (0.084d. per kWh sold); local rates took nearly as much, *i.e.*, £7.2 million (0.083d.), while management absorbed £10.3 million (0.124d.). Three-quarters of the works cost of generation went in coal (0.143d. per kWh generated), the other quarter of the total of £19.5 million (0.046d.) being divided fairly equally between salaries and wages account and repairs and maintenance, including oil, water and stores.

After deducting working expenses from revenue from working and adding £3 million as interest, dividends and miscellaneous income, the gross surplus worked out at £47.6 million, of which 41.14 per cent. was paid out in interest and dividends, and 3.35 per cent. was due for income tax. Depreciation, reserve, renewals, loan repayment, sinking funds and amounts applied to capital outlay accounted for 52.91 per cent. and other purposes for 2.04 per cent., the net increase in balances on net revenue account being 0.56 per cent.

The number of staff and workmen employed was 107,017; this was an increase of 3,486 over 1937-38 and only half of the increase of the latter year over the one preceding it. Salaries and wages were £17.6 million, a rise of £1.9 million. The estimate of the administrative expenses incurred by the Electricity Commissioners for 1941-42 was £48,700. Interest and sinking fund charges for expenditure on standardisation of frequency amounted to £777,500.

An estimate of £93,600 (compared with £48,000 for the previous year) was approved by the Minister of Transport for payment made by the Commissioners to the Central Electricity Board in connection with civil defence. The total expenses of the Commissioners, for 1941-42, namely £919,800 thus represent the equivalent of 17s. 11d. per £100 of revenue obtained in 1940 from the sale of electricity to consumers, excluding bulk supplies.

Lamp Sales

Further Details of Manufacturers' Publicity Arrangements

IN our last issue we referred to the publicity schemes which some of the lamp manufacturers have prepared for the 1941–42 lighting season. We now give details of the plans which other manufacturers have in hand to assist dealers during the coming season.

Siemens Electric Lamps & Supplies, Ltd.

In the interest of national economy the publicity scheme of Siemens Electric Lamps and Supplies, Ltd., has been curtailed. Nevertheless the company has a number of attractive sales aids from which dealers can choose. In view of the urgent necessity for speeding up output in factories the company is paying special attention to better industrial lighting and to this end displayed advertisements will appear in the principal trade journals.

A limited quantity of the "Vase" centre-piece with the slogan "Siemens Lamps Brighten the Home," which proved so popular last year, is available, and the company is prepared to dress dealers' windows with lamp display material using this as the central feature. Supplies of the "Judge" showcard are available and also a counter cut-out. It is not proposed this year to distribute price lists so

The Siemens "Vase" centre-piece

lavishly as in previous years but these will be available for the trade. Ample stocks of lamps have been built up at the company's depots throughout the country.

Ensign Lamps, Ltd.

The campaign of Ensign Lamps, Ltd., for the forthcoming season is comprehensive and Press publicity will be on an even larger scale than last year. In addition to making use of a long list of commercial and technical publications, a national advertising campaign is being conducted in the leading newspapers covering the

Ensign cut-out showcard

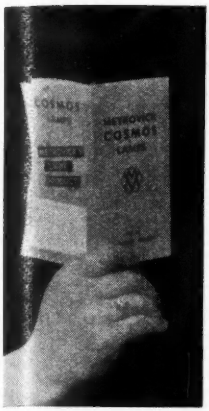
principal centres of distribution throughout the country.

As a means of tying up with this publicity, retailers will find particular interest in the wide range of Ensign sales helps and promotion matter. There are two striking centre displays and four effective cut-out showcards, in addition to pelmets, leaflets and dummy containers. With a little ingenuity these aids may be arranged into very attractive displays even in a limited amount of space.

Metropolitan-Vickers Electrical Co., Ltd.

"Metrovick's 'Light' Product" is the slogan to be used for the coming season by the Metropolitan-Vickers Electrical Co., Ltd., in its publicity campaign for "Metrovick" and "Cosmos" lamps. Owing to the national necessity for paper economy, considerable curtailment n the volume of publicity matter issued has been decided upon. With the paper available an attempt has been made to make every square inch yield the fullest advantage. This will be seen from the price folder which is the main item in the new season's campaign

A colour (orange) has been used to depict on each page a typical illustration of the lamps scheduled, the letterpress being overprinted on the illustrations. The "Cosmos" girl calendar of a reduced size will be available. A small folder illustrating all types of fittings for use in the factory lighting campaign is also being issued. No new catalogues, window displays or showcards have been produced, but quantities of previous seasons' publicity matter are available and can be had on request to the company's nearest local depot. A series of advertisements will be appearing in all trade journals during the season.

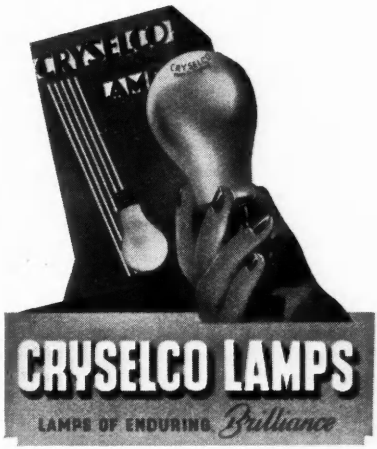


New "Metrovick" price folder

Cryselco, Ltd.

The publicity scheme of Cryselco, Ltd., includes two showcards. One is a general showcard, the frontispiece of which emphasises the need for good lighting in the home and factory. On the reverse side there is a price chart covering all general lighting service lamps. The other showcard relates to cycle lamps and on its reverse is a price chart giving particulars of the lamps which the company can supply and also the various makes of cycles on which these should be used.

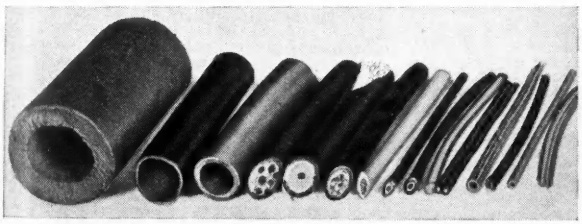
Another sales aid which the company has produced is a small counter cut-out which we show in the accompanying illustration. General price lists and cycle lamp price lists will be available in limited quantities for distribution to the trade.



The counter cut-out which is being distributed by Cryselco, Ltd.

Plastic Insulating Sleeving

ALTHOUGH the company has been in operation only since the spring, Duratube & Wire, Ltd., Faggs Road, Feltham, Middlesex, has already developed a range of thermo-plastic materials of polyvinyl chloride derivation, the electrical and chemical properties of which make them suitable for all insulation purposes. It is claimed for "Duratuf," as the material is called, that it is non-inflammable; non-ageing; resistant to moisture, acid, oils and most chemicals; flexible; and possesses considerable tensile strength (3,500-4,000 lb. per sq. in. at 20 deg. C.). The breakdown voltage conforms with B.S.S. 488, while the dielectric strength is particularly high. Insulating sleeving ("Duratube") made of this material is available in any colour or combination of colours, in any grade of flexibility, and in sizes from ½ in. to 2 in. or even larger.



"Duratube" insulating sleevings and "Durawire" wires and cables

For special applications there are the heat-resisting "Duracott," with a layer of cotton between two layers of plastic, and the similar "Duratubex" without the outside layer of plastic. Covered wires and cables ("Durawire"), including multicore and high-frequency types, are supplied with any thickness of insulation. "Duratuf" is also very suitable for covering capillary tubing, flexible steel tubing, ropes and cords.

COMMERCE and INDUSTRY

Building Industry Registration. Increased War Bonus for Electricians. Approval of Meters.

Registration of Builders, etc.

IT was originally stipulated that all firms engaged in the building and civil engineering contracting industry should register by September 1st with the Ministry of Works and Buildings. Any firm failing to register will not be allowed to carry on business after October 1st. Apparently there has been difficulty in providing the necessary forms and accordingly the period has been extended for those who could not obtain forms, until September 12th.

Mr. Penwill, Director and Secretary of the Electrical Contractors' Association, points out to members that the Order covers undertakings engaged in the installation of heating, ventilating and electrical equipment. The appropriate forms, which can be obtained from local offices of the Ministry of Labour, are B.C.E. 2 and 3. There is also an explanatory leaflet, B.C.E.1.

The conditions of registration provide that employees must not work for more than 60 hours a week on weekdays and that Sunday labour is prohibited except for the immediate repair of air-raid damage or on other work of exceptional urgency.

Wages in the Contracting Industry

Following the decision of the National Arbitration Tribunal that the war wages agreement approved by the National Joint Industrial Council for the Electrical Contracting Industry must continue to be operated as it stands, the war addition to electricians' wages is to be increased from 11s. 8d. to 18s. 4d. a week as from the first pay day in September.

It will be remembered that the National Federated Electrical Association desired to vary Clause 3 of the agreement, but the Tribunal decided that the agreement was so drafted as to make it operable for the period of the war unless both parties agreed to its abrogation or variation, or legislation was passed to set such agreements aside.

Engineers' Wage Demand

Last week the Amalgamated Engineering Union presented a claim to the Employers' Federation for an advance of 4d. per hour in basic rates. The employers are to consider the argument put forward in favour of the increase and prepare a reply. It is expected that the claim will eventually be referred to the National Arbitration Tribunal.

Women in Industry

An intensified "drive" for the recruitment of women to the Forces and industry is being conducted by the Ministry of Labour and National Service. The registration of women up to thirty years of age will be completed by the end of the year and further registrations will follow.

It is stated that apart from 200,000 for the A.T.S., 500,000 women will be needed for vital war work within the next twelve months. Among the industries specifically mentioned by the Ministry are electric cable making; engineering in undertakings engaged on armament and munitions production, including training for such work at Government training centres, technical colleges or employers' establishments; and radio manufacture.

Trading with Syria and the Lebanon

The Board of Trade has made the Trading with the Enemy (Specified Areas) (No. 6) Revocation Order, 1941, which rescinds the Enemy (Specified Areas) (No. 6) Order, 1941 (a) in which it was laid down that provisions of the Trading with the Enemy Act, 1939 (2 & 3 Geo. 6. c. 89), should apply to Syria and the Lebanon as to enemy territory.

Industrial Law Course

With the entry into factories of more persons on the labour and personnel management side, the Industrial Welfare Society's correspondence course in industrial law serves a useful purpose in providing them with the necessary knowledge of the legal principles affecting their work. One of the main advantages is that the course does not presuppose previous legal training on the part of those taking it, and the various points are explained in non-legal language.

The course consists of six complete lectures on the following subjects: The Law of Master and Servant; Factories Act; Truck Acts; Trade Boards; Employers' Liability and Workmen's Compensation; National Insurance; and the Law Relating to Works Welfare, together with the answering of the questions submitted by the individual student. The War Emergency Legislation on these subjects is also covered.

Applications for joining the course or for further particulars should be made to the Secretary, Industrial Welfare Society, 14, Hobart Place, Westminster, London, S.W.1.

Works A.R.P. Exercise

An interesting A.R.P. exercise took place last week at the works of S. Wolf & Co., Ltd. Over 90 members of the staff A.R.P. personnel took part and the programme included ten incidents involving the activities of fire-fighting squads, first-aid and stretcher parties, and spotters. The proceedings opened with an "alert" when all members of the staff, including A.R.P. personnel with the exception of patrols, went to the shelters The fall of incendiaries was reported by the patrols by "Telematic" phone to the works control room from which the local A.R.P. post was advised and the fire-fighting squads called from the shelters. From several sections of the works supplementary applications were made to control for additional services, including first-aid, hydrant hose squads and stretcher parties. The retention of reserve squads enabled all requirements to be met even when some waste oil was set on fire by a cigarette end. A surprise gas attack found 99 per cent. of the staff ready with gas masks and the anti-gas-clothing staff were fully dressed in record time. The exercise disclosed a weak spot in the communications system and also the allocation

of the A.R.P. personnel. The work of the fire fighters, first-aid parties and stretcher bearers was highly commended by the borough A.R.P. experts and the company's managing director, Mr. H. Richards.

Government and the Railways

The terms of the new agreement between the Government and the main-line railway companies and the London Passenger Transport Board were announced last week. The arrangement is to operate from January 1st this year and continue for a minimum period of a year after the cessation of hostilities. It involves the payment to the undertakings of £43,000,000 of which the Southern Railway is to receive £6,607,000 and the Transport Board £4,840,000. The amounts are exclusive of the net sum required for interest on capital redeemed after the basic period of the original agreement (after the end of 1937 for the main-line railways and after June, 1939, for the Transport Board) and of the net revenue derived from investments in road transport undertakings and in the Irish railways.

The existing agreement provided that the Government should meet the cost of repairing war damage up to a maximum of £10,000,000. The new agreement provides that the railways shall come into the scheme for public utilities which is to be introduced by the Government.

Approval of Meters

The Electricity Commissioners have given notice that under the Electricity (Supply) Acts, 1882 to 1936, all approvals of the construction and pattern of electricity meters, and the manner of fixing them to the service lines, for which the period of application expires on or after August 1st, 1940, are extended up to the expiration of twelve months after the end of the present emergency.

Electrical Review Index

Copies of the index to Volume CXXVIII of the ELECTRICAL REVIEW (November, 1940, to July, 1941) are now available, and those readers desiring them should apply to the Publisher, ELECTRICAL REVIEW, Dorset House, Stamford Street, S.E.1.

Food Storage

Referring to the article on " Food Storage " on page 85 of our issue of August 15th, Bull Motors, Ltd., point out that the description of their " Super Tandem " motors used for the lifts, *i.e.*, " 15-HP and 2-HP motors to ensure correct landing, etc.," tends to give an incorrect impression of the special characteristics of this type of motor, as the inference is that two separate motors are involved. The Bull " Super Tandem " motor is actually a combination of two components, the slip-ring component being used for acceleration and high-speed running, and both components, slip-ring and squirrel-cage, are combined to achieve smooth deceleration and low-speed levelling. The motor cannot thus be described as a two-motor unit. This motor, which was specially designed for lift operation, has many advantages over the " two-motor " type of equipment and large numbers are now being made for important contracts. It is manufactured in speed ranges of from 3 : 1 to 6 : 1. In the same article it is mentioned that the exciter on the compressor motor shaft supplies a field current to produce a power factor of 0.85 *lagging* at full load. This should be *leading*.

American Sales of Electrical Goods

All indices of the National Electrical Manufacturers' Association for heavy industrial goods and appliances record unprecedented high records for the six months of this year, says the Association, quoted by *Reuter's Trade Service*. Orders for motors and generators for the first half of this year were 179 per cent. ahead of the corresponding period in 1940, and 305 per cent. ahead of 1939. Sales of industrial materials showed a 95 per cent. increase on 1940 and 165 per cent. on 1939. Orders for transmission and distribution equipment were 118 per cent. above 1940 and 195 per cent. above 1939. Sales of major appliances, excluding refrigerators, were 40 per cent. above 1940, and 66 per cent. above 1939. Domestic sales of household refrigerators rose 36 per cent. on 1940 and 88 per cent. on 1939.

Mobile Canteen for Liverpool

On August 22nd one of seven mobile canteens sent by the American Federation of Business and Professional Women was presented to the City of Liverpool by Miss C. Haslett, chairman of the British Federation, who said that such a gift from the women of the U.S.A. was a fitting tribute to the fortitude of the people of Liverpool. Among the many women's organisations represented in addition to the Liverpool Branch of the E.A.W., through whose offices the presentation was made and who will help to staff the canteen, were the Soroptimists, the National Federation of Business and Professional Women's Clubs, and the Association of Teachers of Domestic Subjects. The city electrical engineer, Mr. P. J. Robinson, was responsible for many of the arrangements, and the canteen now becomes part of a fleet controlled by Mr. G. W. Molyneux, Public Assistance Officer.

Australian Magnet Wire Tariff

According to the *Electrical Engineer and Merchandiser*, after an adjournment of three months, which had been granted by the Tariff Board to enable British manufacturers to submit evidence, the hearing of an application by Rola Co. (Aust.) Pty., Ltd. for protective duties on magnet winding wire manufactured by the company was resumed in May. The company announced that it had amended its original request for 40 per cent. British preferential tariff to one of 20 per cent., 30 per cent. and 40 per cent., British preference, according to the various gauges of wire.

New Catalogues and Lists

Edison Swan Electric Co., Ltd., 155, Charing Cross Road, London, W.C.2.—Priced and illustrated folder (L.E. 1218) descriptive of 80-W fluorescent discharge tubes and fittings in industrial and commercial service.

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—Priced and illustrated leaflet (B.C. 9339) descriptive of control box type moving-coil microphone for announcing systems.

M. Semet & Co., Ltd., 2, Caxton Street, London, S.W.1.—A card drawing attention to the company's stud driver-extractor.

Murex Welding Processes, Ltd., Hertford Road, Waltham Cross, Herts.—Leaflet (M. 21) describing "Nicrex" nickel-chromium electrodes for welding.

Carter & Co. (Nelson), Ltd., William Street, Nelson, Lancs.—List No. 17, containing descriptions of the company's syrens and sound instruments, including a 5-HP twin-note horizontal type syren officially approved by the Home Office for air raid warnings.

TRADE MARK APPLICATIONS

AMONG applications for British trade marks are the following, objections to any of which may be made within a month of August 27th.

KLYSTRON. No. 612,184, Class 9. High-frequency amplifiers, oscillators, detectors, phase-shifters, and frequency shifters for use in electrical apparatus.—Sperry Gyroscope Co., Inc., Manhattan Bridge Plaza, Brooklyn, U.S.A. Address for service: c/o Stevens, Langner, Parry & Rollinson, 5–9, Quality Court, Chancery Lane, London, W.C.2.

MURPHY. No. 614,472, Class 9. Radio transmitting and receiving apparatus, radio-gramophones and television receiving apparatus, and component parts of all these goods; aerials; and electrical measuring and testing apparatus and electrical remote control units, all specially adapted or suitable for use with radio frequency apparatus.—Murphy Radio, Ltd., 62–64, Brook Street, Hanover Square, London, W.1.

HUSBONDENS RÖST (Swedish for "His Master's Voice"). No. 615,392, Class 9. Apparatus, instruments and devices for the recording, reproduction, reception or transmission of sound, television receiving apparatus, electron discharge devices, electric vacuum cleaning apparatus, electric dust extractors, and component parts of all the aforementioned goods (other than electric motors); electric flat irons. Also No. 615,393, Class 11. Refrigerating machines and apparatus and component parts thereof; electric heating and cooking apparatus.—The Gramophone Co., Ltd., Blyth Road, Hayes, Middlesex.

HURSEAL. No. 615,344, Class 11. Radiators (not parts of machines), clothes drying cabinets, and heated towel rail airers.—Max Hurley, 106, Regent Street, London, W.1.

Imports of Sumatra

Germany's Diminishing Share

THE encouragement given by the State to the development of electricity in the Dutch East Indies generally was referred to in a recent statistical survey of the Java and Madura market (ELECTRICAL REVIEW, August 22nd). Such encouragement extends also to Sumatra, Borneo, the Celebes and the Outer Possessions, but trade there is on a smaller scale. Imports in 1940 of the principal electrical lines are shown in the accompanying table, with notes of increases or decreases compared with 1939. Germany, which used to have a substantial share of the market, scarcely appears as a supplier in 1940, nor did Japan make any headway.

Not only mines but also plantations favour electrical installations both for the sake of economy and in order to attract the best kind of labour available. (£1 = about 7½ fl.).

	1940 Fl. (000)	Inc. or dec. on 1939
Dynamos, motors, transformers, etc.—		
Total	380	−390
From Holland	116	−370
„ Germany	2	−143
„ Sweden	6	− 1
„ Switzerland	62	+ 32
„ United States	172	+ 96
„ Great Britain	11	+ 11
Radio apparatus and parts—		
Total	19	+ 8
From Holland	6	—
„ United States	13	+ 10
Radio valves—		
Total	41	− 60
From Holland	39	− 61
„ United States	00	00
Electric bulbs for cycles and torches—		
Total	59	− 32
From China	55	− 23
Electric bulbs for motor cars—		
Total	7	− 6
From Holland	6	− 3
Electric bulbs, other types—		
Total	230	− 53
From Holland	206	+ 23
„ Germany	3	− 18
Electric pocket and cycle lamps with batteries—		
Total	104	− 7
From China	58	+ 33
Electric cable—		
Total	274	−193
From Holland	75	− 80
„ United States	137	+100
„ Italy	3	−197
„ Great Britain	50	+ 36
Electrical installation material for buildings, unspecified—		
Total	172	− 24
From Holland	61	− 4
„ Germany	13	− 62
„ Japan	2	+ 2
„ United States	72	+ 40
Batteries for torches—		
Total	100	− 28
From China	49	+ 6
„ Hong Kong	41	+ 12
Accumulators—		
Total	89	+ 18
From Australia	10	+ 10
„ United States	50	+ 17
„ Germany	1	− 8
„ Japan	12	− 1

ELECTRICITY SUPPLY

Record United States Output.

Swedish Rural Electrification.

Bacup.—STREET LIGHTING PLANS.—The Town Council proposes to extend the modified street lighting by a further 178 fittings.

Bangor (North Wales).—SUBSTATION SWITCHGEAR.—The Town Council is seeking sanction to a loan of £2,000 for switchgear and a metering panel at a substation.

Glendale (Northumberland).—RURAL SUPPLIES.—The Rural District Council is to investigate the possibility of having electriciiy supplied to the villages of Millfield, Fenton and Doddington.

Otley. — SUBSTATION. — The Urban District Council has approved plans for the erection of a substation for the Electrical Distribution of Yorkshire, Ltd.

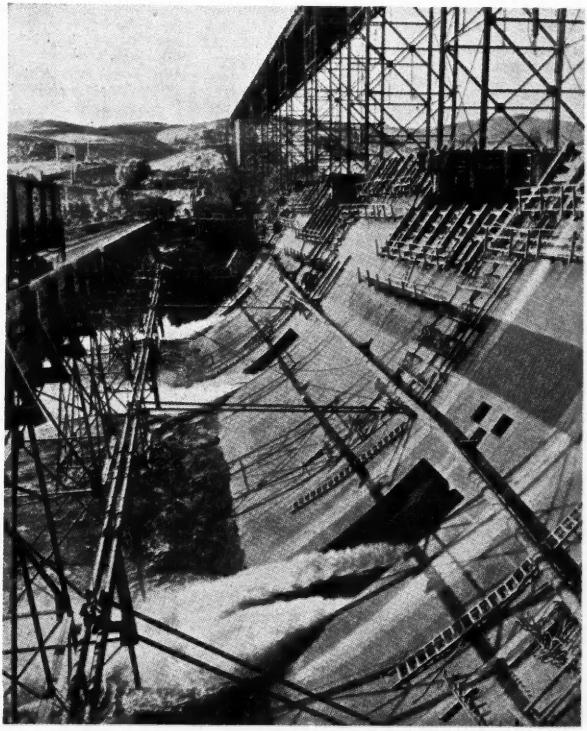
Rowley Regis.— PROPOSED SUBSTATION.—The Town Council has approved plans for the erection of substation premises for the Midland Electric Corporation for Power Distribution, Ltd.

Runcorn. — SHELTER INSTALLATIONS. — The Urban District Council has obtained sanction to proceed with the lighting and heating of 352 shelters at a cost of £3,630 and £3,371, respectively.

Overseas

Canada.—QUEBEC POWER POOL.—The new 110-kV cable which is being laid across Montreal to interconnect the Beauharnois and Shawinigan systems is stated in *Electrical News and Engineering* to be a war measure of considerable importance. As the systems of the Shawinigan Water and Power Co. and the Aluminium Power Co. are already linked, this new connection virtually completes a substantial Quebec power pool. Last autumn a 220-kV transmission line was completed from Three Rivers to the city of Quebec to supply power from the new plant at La Tuque and Rapid Blanc (Shawinigan system) to the Quebec City area. This was necessary to make up for the 100,000 HP from the Saguenay Power Co., which has been diverted from Shawinigan to the operations on the Saguenay River at Arvida.

Near here an extensive development is now under way for utilising the river to its fullest extent, aiming ultimately at a plant capacity of over a million horse-power. The dam at the Aluminium Co.'s Chute-a-Caron plant, where two additional 50,000-HP units are being installed to meet present needs, will be used to deliver water from the Saguenay through a canal to the new development at the head of the tidal reach of the river, where there is an operating head of 208 ft., as compared with 150 ft. at Chute-a-Caron. An essential part of this programme is the building of



Courtesy, "Electrical World"

Work in progress on the construction of the Friant Dam on the San Joaquin River, California. The dam, said to be the fourth largest in the world, is part of the Central Valley project for irrigation, flood control, navigation and power production

a storage dam on the upper reaches of the Peribonka River, a tributary of the Saguenay, to maintain the flow of water during the winter. The present planned installation for the new development calls for six units each of 85,000 HP, but war conditions may change this.

Sweden.—INTENSIVE RURAL ELECTRIFICATION.—The lack of paraffin and suitable substitutes has resulted in an unprecedented number of applications for electricity supply. Electrification of the countryside has for some years been fairly general in Sweden, extending even to sparsely settled regions. According to a computation made by the State Fuel Commission last autumn, however, there remained 267,000 households in the country without electricity. This has now been reduced to about 210,000, which means that electricity has been provided for about 60,000 households in less than a year. Many islands along the coast have now been connected up with the mainland supply system.

United States.—RECORD OUTPUT.—The Federal Power Commission reports that the 1940 production of electrical energy in the United States exceeded the previous record, in 1939, by more than 14,600 million kWh, or 11.2 per cent. The installed capacity of generating plants at the end of 1940 was 41,638,956 kW, a net increase of 1,321,032 kW (3.3 per cent.). Total production for 1940 was 144,985 million kWh (privately owned utilities produced 127,642 million kWh from a total installed capacity of 35,500,651 kW).

ALTERNATIVE TO ST. LAWRENCE PROJECT.—Plans by which it is said that the United States could obtain much more power in the Niagara and International Rapids sections of New York than would be developed by the proposed St. Lawrence waterway have been laid before the Rivers and Harbours Committee which is studying legislation ratifying the Canadian-United States agreement to undertake the scheme. The *Electrical World* reports that the alternative proposal has been put forward by Mr. B. D. Tallamy, chief engineer of the Niagara Frontier Planning Commission, who says that 95,000 HP (high load factor) can be developed on the American side and 87,000 HP on the Canadian side merely by additional diversion of water at Niagara Falls, and without damaging the scenic beauty of the falls. Generating equipment to produce this power is now idle for lack of water. The Beauharnois station on the Canadian side of the International Rapids is capable of producing an additional 700,000 HP if the mud channel is dredged and machinery installed. Mr. Tallamy proposes that the United States should arrange to buy this power, if needed, for defence, in furtherance of the announced U.S. policy of purchasing greater supplies of Canadian resources as an aid to that country's trade balance. This power would also be available as a high-load-factor supply for aluminium and chemical process operations. If even more is required for defence, he suggests that the Beauharnois site could be developed to the extent of an additional 750,000 HP, and other Canadian hydro-electric plants could produce 2,850,000 HP more.

TRANSPORT

Darwen.—TRAMWAY REPAIRS.—Following a report on a visit by the Regional Transport Commissioner the Transport Committee has authorised the manager (Mr. L. Wilkes) to carry out necessary repairs to vehicles and overhead equipment. Originally it was intended to supersede trams by buses but the war interfered with the implementation of the scheme.

Leeds.—FLASHES ON OVERHEAD CONDUCTORS.—The City Transport Department is taking further steps to reduce the amount of flashing on overhead equipment on the tram routes. Several devices are being tried, and in addition drivers have been instructed to switch off the current at junctions and crossings where the flashes are most prevalent.

Manchester. — TROLLEY-BUSES. — The Corporation Transport Committee has obtained the consent of the Ministry of War Transport to the use of trolley-buses in certain streets to connect up with existing services.

Newcastle-on-Tyne.—RELIEVING CONGESTION.—Efforts are being continued by the Northern Regional Transport Commissioner to arrange for the staggering of hours at works to relieve congestion on transport services. Progress in this direction has been made, especially on Tees-side, and it is hoped that before winter a scheme of staggered hours will be adopted generally.

Sunderland.—SAFEGUARDING TRAMWAYS SUPPLY.—The Town Council is to provide a rotary convertor, at an estimated cost of £1,900, in order to maintain the tram services in the event of damage to the electrical plant.

United States. — ATLANTA'S TRAMS. — In Atlanta, capital of Georgia, trams—or street-cars as they are called in America—remain the chief means of public passenger transport. They operate on 102 miles of route and there is electric-drive, in the form of trolley-buses, on a further 21 route miles, while motor-buses cover 63 route miles. The area served has a population of 442,000, and last year the total operating revenue was $4,284,000, of which electrically-propelled vehicles were responsible for nearly 82 per cent. *Mass Transportation* expresses the view that modernisation in Atlanta will eventually take the form of trolley-buses on most routes, with motor-buses on the shorter routes in less populous areas.

ELECTRIC TRANSMISSION IN BUSES.—Writing on "Modern Transit Vehicles" in the same journal, Mr. G. M. Woods, transport engineer, Westinghouse Electric and Manufacturing Co., says that after a period of relative inactivity electric transmission for buses has again come into prominence. Greater engine power, rear mounting of engines and the extensive use of Diesel power units are factors which have made improved transmission important. There are 3,500 buses (including all-service vehicles) with electric transmission, more than 500 having been purchased in the first three months of this year. Electric transmission under normal conditions effects an increase of 10 per cent. in schedule speed and the absence of clutch and mechanical transmission reduces maintenance. The engine-generator set can be mounted very flexibly because all the engine power is absorbed by the auxiliaries or transmitted electrically; there is no direct mechanical drive connection between engine and chassis.

TROLLEY-COACH PROGRESS.—It is stated that the number of trolley-coaches (excluding all-service vehicles) in use and on order in the United States at May 1st was 2,629, an addition of 221 during the first four months of the year.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

James Howden & Co., Ltd.—Speaking at last Friday's annual meeting, the chairman (Mr. C. W. Hume) said that the year under review had been one of great effort and ever-increasing production; they felt satisfied that they had met the demands upon them. The state of their order book ensured full employment for the works for more than a year. Mr. Hume mentioned that the consolidated balance-sheet included the figures for the subsidiary James Howden & Co. (Land), Ltd., all of whose shares were held by the company.

Thorn Electrical Industries, Ltd., earned a net profit (after meeting taxation) of £25,634 for the year ended March 31st last (against £24,263 for 1939–40). The ordinary dividend is maintained at 20 per cent. and £15,000 is again transferred to general reserve. The balance carried forward is reduced from £7,823 to £6,733.

Broadcast Relay Service, Ltd. reports trading profits for the year to March 31st, of £101,114, as compared with £131,034 for 1939-40. A sum of £47,561 has been transferred to central reserve for replacement and renewals and it is proposed to pay a final ordinary dividend of 5 per cent., again making 10 per cent. for the year, and to carry forward £20,921 (against £18,693 brought in). At a meeting to be held on September 19th, a resolution will be submitted increasing the authorised capital by £250,000.

Telephone Rentals, Ltd., reports a profit for the year to May 31st, before charging £66,897 income tax, of £136,312, an increase as compared with the preceding year of £8,945. General reserve receives £25 000, and it is proposed to pay a final dividend of 6 per cent., again making 10 per cent. less tax for the year, and to carry forward £41,448 (against £39.648 brought in).

The East African Power & Lighting Co., Ltd., reports a net revenue for 1940 of £118,944, as compared with £104,089 for 1939. Income tax requires £1,551, depreciation £28,615, and £5,000 is transferred to general reserve. The final ordinary dividend is 4 per cent., making 7 per cent. for the year (unchanged) and £27,887 is carried forward (against £18,043 brought in).

The Ransome & Marles Bearing Co., Ltd., reports a net profit for 1940–41 of £113,295, as compared with £163,038 for the preceding year. The final dividend is 11 per cent., maintaining the distribution for the year at 20 per cent.

The London Electrical & General Trust, Ltd., reports a net revenue for the year to June 30th of £31,254, as compared with £32,649 for 1939–40. The final dividend is 3 per cent., making 5 per cent. for the year (against 5½ per cent.), and £15,251 is carried forward (against £14,897 brought in).

The British Power & Light Corporation, Ltd., is again paying an interim dividend of 2 per cent.

The Electric Furnace Co., Ltd., reports a net profit of £47,662 for the year to March 31st last, as compared with £48,802 for 1939–40. From this £31,000 (against £24,000) is deducted for taxation; the dividend is raised from 7 to 8 per cent. and the carry-forward (subject to directors' remuneration) from £6,650 to £6,961.

The Palestine Electric Corporation, Ltd., reports a surplus on working for 1940 of £P.142,480, after deducting £P.137,040 for depreciation, and after paying the dividends on the preference and second preference shares, £P.52,000 is placed to reserve for income tax and £P.90,656 is carried forward (against £P.75,323 brought in).

Kelvinator Australia, Ltd., reports a surplus of £9,693 for 1940-41, after reserving £7,400 for taxation. The holders of the 6 per cent. participating preference stock received 7½ per cent. and the ordinary shareholders 10 per cent.

British Ropes, Ltd., has declared an interim dividend of 5 per cent., as last year.

Brown Bros., Ltd., are maintaining their interim dividend at 2½ per cent.

The British Oxygen Co., Ltd., has declared an interim dividend on the ordinary stock of 7 per cent., less tax (unchanged).

Walsall Conduits Ltd., has declared an interim dividend of 20 per cent. (unchanged).

The Electrolux Corporation (of America) has announced a dividend of 20 cents a share.

New Companies

Becker Patents Co., Ltd.—Private company. Registered August 23rd. Capital, £100. Objects: To acquire patents, and to carry on the business of manufacturers of, and dealers in, electrical, electro-mechanical and electro-chemical appliances and apparatus, etc. Subscribers: Wm. J. Burrows, 26, High Worple, Harrow, and J. A. Ramsey, 130/132, Leadenhall Street, E.C.3. Solicitor: J. A. Ramsey, 130/132, Leadenhall Street, E.C.3.

Becker-Simmonds Manufacturing Co., Ltd.—Private company. Registered August 23rd. Capital, £100. Objects: To carry on the business of manufacturers of, and dealers in, electrical, electro-mechanical and electro-chemical appliances and apparatus, etc. Other particulars similar to Becker Patents Co., Ltd., above.

Nelson, Thompson & North (Radcliffe), Ltd.—Private company. Registered August 16th. Capital, £500. Objects: To carry on the business electrical, wireless, mechanical and general engineers, dealers in, and agents for, wireless and television apparatus and accessories, &c. Directors: N. Nelson, 20, Park Road, Crumpsall, Manchester, 8; H. B. S. Thompson, 3, Miller Road, Oldham, and J. C. North, 88, Appleby Lodge, Wilmslow Road, Manchester. Registered office: Pitt Street Works, Radcliffe, Lancs.

Wico-Pacy Sales Corporation, Ltd.—Private company. Registered August 13th. Capital £1,000. Objects: To carry on the business of manufacturers, designers, assemblers and repairers of and dealers in magnetos, dynamos, armatures, batteries, condúctors, insulators, transformers, convertors, switchboards, sparking

plugs, electrical plant generally, etc. Subscribers: C. B. Jarman, 2, Kingshill Drive, Kenton, Harrow, Mdx., and R. F. Saunderson, 10, Christchurch Avenue, Kenton, Mdx. Solicitors: Hyman Isaacs, Lewis & Mills, Audrey House, Ely Place, E.C.

Dribat, Ltd.—Private company. Registered August 20th. Capital, £2,000. Objects: To carry on the business of wholesale and retail dealers in and manufacturers of batteries, accumulators, dynamos, etc. Subscribers: E. Flynn, 22, Northumberland Avenue, W.C. 2., and K. L. Pincott, 26, Martin Lane, Cannon Street, E.C. 4. Solicitors: Tarlo Lyons & Co., 26, Martin Lane, Cannon Street, E.C.4.

Universal Welding & Construction Co., Ltd.—Private company. Registered in Edinburgh August 20th. Capital, £5,000. Objects: To carry on the business of electric and oxy-acetylene welders, boiler makers and repairers, etc. Directors: P. B. W. Crighton, Drumadoon, Kilmacolm, and two others. Registered office: 144, St. Vincent Street, Glasgow.

Companies' Returns

Statements of Capital

Pirelli, Ltd.—Capital, £400,000 in 400,000 shares of £1 each. Return dated April 18th, 1941. All shares taken up. £400,000 paid. Mortgages and charges: £150,000.

Salisbury Electric Light & Supply Co., Ltd.—Capital, £125,000 in £1 shares. Return dated April 30th, 1941. All shares taken up. £122,500 paid. £2,500 considered as paid. Mortgages and charges: £15,700.

Erskine, Heap & Co., Ltd.—Capital, £50,000 in 10s. shares. Return dated April 17th, 1941. 94,978 shares taken up. £4,913 paid on 9,826 shares. £42,576 considered as paid on 85,152 shares. Mortgages and charges: Nil.

Londona, Ltd.—Capital, £100 in £1 shares. Return dated December 13th, 1940 (filed April 30th, 1941). 13 shares taken up. £13 paid. Mortgages and charges: Nil.

Key Engineering Co., Ltd.—Capital, £12,000 in £1 shares. Return dated April 17th, 1941. 11,746 shares taken up. £11,746 paid. Mortgages and charges: Nil.

North Eastern Electric Supply Co., Ltd.—Capital, £8,760,000 in 1,500,000 7 per cent. cumulative preference, 2,500,000 5 per cent. preference and 4,760,000 ordinary shares of £1 each. Return dated April 2nd, 1941. 1,500,000 cumulative preference, 1,609,640 preference and 4,759,919 ordinary shares taken up. £6,806,700 paid. £1,062,859 considered as paid. Mortgages and charges: £5,817,421.

Amesbury Electric Light & General Supply Co., Ltd.—Capital, £12,000 in £1 shares. Return dated March 20th, 1941. All shares taken up. £12,000 paid. Mortgages and charges: Nil.

Clifford & Snell, Ltd.—Capital, £5,000 in 3,900 ordinary shares of £1, 4,000 deferred ordinary shares of 5s. and 4,000 deferred " A " shares of 6d. each. Return dated April 19th, 1941. 3,338 ordinary, 4,000 deferred ordinary and 4,000 deferred " A " shares taken up. £4,188 paid on 3,338 ordinary, 3,000 deferred ordinary and 4,000 deferred " A " shares. £250 considered as paid on 1,000 deferred ordinary shares. Mortgages and charges: Nil.

Electric Transmission, Ltd.—Capital, £10,000 in 10,000 ordinary shares of £1 each. Return dated April 21st, 1941. 5,000 shares taken up. £5,000 paid. Mortgages and charges: Nil.

Vickers, Ltd.—Capital, £26,500,000 in 23,684,516 ordinary shares of 10s., £6,157,742 ordinary stock, 136,193 cumulative preference shares of £1, £6,683,807 cumulative preference stock, £750,000 5 per cent. preference stock and £750,000 preferred 5 per cent. stock. Return dated April 17th, 1941. All ordinary, preference and preferred stock taken up. £4,520,673 13s. 4d. paid. £10,000,875 6s. 8d. considered as paid. Mortgages and charges: £977,233 at 4 per cent.

Increase of Capital

Specialised Radio Service Co., Ltd.—The nominal capital has been increased by the addition of £500 in £1 ordinary shares beyond the registered capital of £500.

Mortgages and Charges

Regentone Products, Ltd.—Mortgage on proceeds of certain contracts, dated August 7th, 1941, to secure all moneys due or to become due from the company to Barclays Bank, Ltd., not exceeding £2,600 at any one time.

K. L. B. Electric, Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated August 7th, 1941, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Electric Clock Service, Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated August 15th, 1941, to secure £500. Holders: Provincial Incandescent Fittings Co., Ltd., Pifco House, Watling Street, Manchester.

Nigerian Electricity Supply Corporation, Ltd.—Satisfaction to the extent of £10,789 on June 30th, 1941, of trust deed dated August 24th, 1933, and registered August 31st, 1933, securing £300,000 6 per cent. first mortgage redeemable debenture stock. A supplemental trust deed dated July 6th, 1939, cancelled £20,000 of the original stock remaining unissued and amended the terms of the original deed.

Receivers Released

Metcalf Electrics, Ltd.—J. P. Wardale, Hepper House, East Parade, Leeds, ceased to act as receiver on August 11th, 1941.

P. and L. Radio, Ltd.—H. E. Hunt, 18, Waterloo Road, Epsom, ceased to act as receiver and/or manager on August 14th, 1941.

Bankruptcy

G. A. Weston, electrical contractor and engineer, 5-6, Roman Wall House, Crutched Friars, London, E.C.3.—First meeting held September 3rd. Public examination October 14th, at Bankruptcy Buildings, Carey Street, London, W.C.2.

STOCKS AND SHARES

TUESDAY EVENING.

STOCK Exchange business is somewhat of a spasmodic order, one day's activity being succeeded by quietude and lack of public interest. Once more, the majority of price changes in the following lists are in the upward direction. Excitement in Home Railway stocks was stirred by publication of the Government's agreement with the railway companies. British Electric Traction deferred has been in demand and Victoria Falls ordinary shares have further advanced. A reduction from 7 per cent. to 5 per cent. in the dividend on Jerusalem Electric ordinary shares was not unexpected. The price remains unchanged. Tokyo Electric sixes are better on a few speculative purchases.

The Railway Agreement

The terms of the Government's new agreement leave more than an element of doubt as to what the position of the companies actually is in respect of possible war damage. It is assumed that the Government will see to it, without giving any hard and fast guarantee, that the dividends on Home Railway stocks are maintained at the same rates as those paid for 1940, and this is, of course, so much to the good.

The doubt which remains as to the liability of the companies for war damage contribution is, however, the reason why investors still hesitate to follow this market in the manner which would appear to be natural in view of the yields which the stocks offer at the present prices. Southern preferred, for example, quoted in our lists at 63½, give £7 17s. 6d. on the money. London Passenger Transport "C" stock has gone back 2 points to 43¼, the previous rise having brought in profit-taking sales.

War Damage Insurance

Some people consider that in the matter of possible war damage, each company will be treated as an individual entity. That is to say, if the Southern Railway should suffer from war damage, the Great Western, under this contention, would not be called upon to pay any proportion of the loss. On the other hand, a body of opinion looks for the Government to announce a plan for war damage insurance to apply as a pool to all the utility companies, electricity, gas, water and railways. Into this pool, runs the argument, all the companies should pay; from it should be drawn compensation for whatever losses may occur by enemy action. Until this point becomes cleared up, the prospective investor in stocks and shares of such undertakings will remain in the dark. It is hoped that the Government will declare its intentions in the near future, and as soon as may be after the reassembling of Parliament.

Henley's

Henley's ordinary shares remain a good market at 21s. 3d. and there is persistent pressure to buy them. The figures for 1940 appeared last week, and it is interesting to compare these with the results published since 1936, the year when £650,000 was capitalised out of reserves. Holders of the then £1 ordinary shares received a free share bonus of 100 per cent. All share capital was converted into stock, the ordinary being in 5s. units:—

Year	Trading Profit	Depreciation	Ord. Div.	Forward
	£	£	£	£
1936 ..	402,491	61,170	243,750	428,408
1937 ..	451,839	68,727	260,000	430,020
1938 ..	445,159	61,012	260,000	415,394
1939 ..	415,204	61,246	260,000	384,331
1940 ..	400,484	69,918	260,000	382,397

The dividend for 1936 was 18¾ per cent. In each of the four following years it has been 20 per cent. At the present price, Henley's ordinary yield £4 14s. 1d. per cent.

Cable and Wireless

To want of interest on the part of the public is attributed the dullness of Cable and Wireless stocks. In these days, when investment is keen upon the acquisition of anything which pays a living rate of return upon reasonable security, it seems surprising that Cable and Wireless 5½ per cent. preference should be on offer at 102. The ordinary—a 4 per cent. dividend on which appears to be tolerably well assured—seldom struggles above 62 or thereabouts. It may be said, of course, that investment is entitled to look for at least 5½ per cent. on its money from a stock in any undertaking whose profits are liable to such fluctuations as those which confront Cable and Wireless. Making due allowance for this, a comparison of the yields which these two particular stocks offer as against those afforded by ordinary shares in a good many front-rank industrial companies, suggests that the Cable and Wireless stocks are not overvalued at their current quotations.

Callender's are a good market at 68s. 9d.; this is ⅛ higher on the week. Crabtree 10s. shares are similarly better at 27s. 6d. General Electric remain at 4.

Miscellaneous Matters

Speculation is busying itself with low-priced shares in companies which are thought to have favourable prospects for after-the-war progress. One of these is Brush Electrical, whose shares have risen 1s. to 4s. Strand Electric shares at 3s. are also 1s. to the good. E. K. Cole at 6s. 9d. are a shade better, and Vactric at 3s. are again 3d. higher. These are all 5s. shares.

Telephone Rentals keep steady at 8s. ex dividend. Telephone Properties, Ltd., announces that, owing to war delays, it will

(*Continued on page* 215)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend 1939-40	Dividend 1940-41	Middle Price Sept. 2	Rise or Fall	Yield £ s. d.
Home Electricity Companies					
Bournemouth and Poole	15	12½	51/3	..	4 17 5
British Power and Light	7	6	25/-	..	4 16 0
City of London	7½	7	25/9xd	+6d.	5 8 9
Clyde Valley	8	8	37/6	..	4 5 4
County of London	10½	8	35/-	..	4 11 5
Edmundson's:					
7% Pref.	7	7	31/3	..	4 9 7
Ord.	6	6	27/-	..	4 9 0
Elec. Dis. Yorkshire	9	9	38/9	..	4 3 0
Elec. Fin. and Securities	12½	12½	42/6	..	5 17 8
Elec. Supply Corporation	11½	10	41/3	..	4 17 0
Isle of Thanet	2	Nil	8/6	..	—
Lancs Light and Power	7½	7½	32/6	..	4 12 4
Llanelly Elec.	5½	5½	21/-	+1/-	5 4 9
Lond. Assoc. Electric	5½	4½	18/9	..	4 16 0
London Electric	7	7	23/9	..	5 18 0
London Power Deb. Red.	5	5	104	..	4 16 2
Metropolitan	10	8	34/6	+9d.	4 12 10
Midland Counties	8	8	37/-	..	4 6 5
Mid. Elec. Power	9	9	37/6	..	4 16 0
Newcastle Elec.	7	7	27/6	..	5 1 10
North Eastern Elec.:					
Ordinary	7	7	29/6	..	4 15 0
7% Pref.	7	7	33/3	..	4 4 2
Northampton	10	10	43/9	..	4 11 5
Notting Hill 6% Pref. (£10)	6	6	8½	..	—
Northmet Power:					
Ordinary	10	7	35/-	..	4 0 0
6% Pref.	6	6	29/6	..	4 1 4
Richmond Elec.	6	6	22/6	..	5 6 8
Scottish Power	8	8	37/6	..	4 5 4
Southern Areas	5	5	17/6	..	5 14 3
South London	7	7	23/6	..	5 19 2
West Devon	5	5	21/3	..	4 14 1
West Glos.	4½	4½	18/3	..	4 18 8
Yorkshire Elec.	8	8	38/3	..	4 4 0
Overseas Electricity Companies					
Atlas Elec.	Nil	Nil	2/9	..	—
Calcutta Elec.	8*	7*	37/-	..	3 15 9
Cawnpore Elec.	10	10	28/3	..	7 1 7
East African Power	7	7	25/9	..	5 8 9
Jerusalem Elec.	7	5	18/9	..	5 6 8
Kalgoorlie (10/-)	7½	7½	12/6	..	6 0 0
Madras Elec.	6*	4*	22/6	−6d.	3 11 1
Montreal Power	1½	1½	24½	..	6 2 5
Palestine Elec. "A"	Nil	Nil	18/3	..	—
Perak Hydro-elec.	2½	6	17/6	..	6 17 2
Shawinigan Power	83cts.	90cts.	14½	..	—
Tokyo Elec. 6%	6	6	29½	+1	20 6 8
Victoria Falls Power	15	15	80/-	+⅛	3 15 0
Whitehall Inv. Pref.	7½	7½	13/9	..	10 18 2

Company	Dividend 1939-40	Dividend 1940-41	Middle Price Sept. 2	Rise or Fall	Yield £ s. d.
Public Boards					
Central Electricity:					
1950–70	5	5	110	..	4 11 1
1955–75	5	5	114	..	4 7 9
1951–73	4½	4½	107	..	4 4 1
1963–93	3½	3½	100½	..	3 9 8
1974–94	3½	3½	94	..	3 9 2
London Elec. Trans. Ltd.	2½	2½	94	..	2 13 2
London & Home Counties 1955–75	4½	4½	106½	..	4 4 6
Lond. Pass. Trans.:					
A	4½	4½	113½	..	3 19 4
B	5	5	110½	+1	4 10 6
C	1½	3	43½	−2	6 17 10
West Midlands J.E.A. 1948–68	5	5	108½	..	4 12 0
Telegraph and Telephone					
Anglo-Am. Tel.:					
Pref.	6	6	107½	..	5 11 9
Def.	1½	1½	24½	..	6 2 5
Anglo-Portuguese	8	8	15/-	..	10 13 4
Cable & Wireless:					
5½% Pref.	4½	5½	102	−1	5 7 10
Ord.	4	4	62	..	6 9 0
Canadian Marconi	$1 Nil	4cts.	6/3	..	3 5 9
Globe Tel. & Tel.:					
Ord.	8½*	8½*	28/9	..	—
Pref.	6	6	27/6	..	4 7 3
Great Northern Tel. (£10)	20	20	12½	..	—
Inter. Tel. & Tel.	Nil	Nil	3	..	—
Marconi-Marine	7½	7½	27/6	+⅛	5 9 1
Oriental Tel. Ord.	11½*	16	3½	..	4 18 6
Telephone Props.	6	6	11/3	..	10 13 4
Tele. Rentals (5/-)	10	10	8/-	..	6 5 0
Traction and Transport					
Anglo. Arg. Trams:					
First Pref. (£5)	Nil	Nil	2/-	..	—
4% Inc.	Nil	Nil	4½	..	—
Brit. Elec. Traction:					
Def. Ord.	45	45	885	+10	5 1 8
Pref. Ord.	8	8	170	..	4 14 2
Bristol Trams	8*	8	41/3	..	3 17 8
Brazil Traction	$1	50c.	8¾	..	—
Calcutta Trams	8	5½	23/9	..	4 12 7
Cape Elec. Trams	5	5	17/-	..	5 17 4
Lancs Transport	10	10	42/6	..	4 14 1
Mexican Light:					
1st Bonds	5	5	45	..	—
Rio 5% Bonds	5	5	85	..	5 17 8
Southern Rly.:					
5% Prefd.	5	5	63½	+3	7 17 6
5% Pref.	5	5	96½	..	5 3 7
T. Tilling	10	10	46/3	..	4 6 7
Tilling & B.A.	8*	7*	52/6	..	2 13 1
West Riding	10	10	39/-	..	5 2 7

(Continued on next page)

* Dividends are paid free of Income Tax.

Company	Dividend 1939–40	Dividend 1940–41	Middle Price Sept. 2	Rise or Fall	Yield p.c.
Equipment and Manufacturing					£ s. d.
Aron Elec. Ord. ..	Nil	7½	20/6	..	7 6 4
Assoc. Elec.:					
Ord.	10	10	42/6	..	4 14 3
Pref.	8	8	36/3	..	4 8 5
Automatic Tel. & El.	12½	12½	46/3	−⅛	5 8 3
Babcock & Wilcox	11	11	44/6	..	4 18 10
British Aluminium .	12½	10	47/6	..	4 4 1
British Insul. Ord. .	20	20	87/6	..	4 11 4
British Thermostat (5/–)	18½	18½	12/6	..	7 8 0
British Vac. Cleaner (5/–)	40	12½	8/3	..	7 11 6
Brush Ord. ..	Nil	Nil	4/–	+1/-	—
Callender's ..	15	15	68/9	+⅛	4 7 0
Chloride Elec. Storage	15	15	65/–	..	4 12 4
Consolidated Signal	17	17	72/6	..	4 13 10
Crabtree (10/–) ..	17½	17½	27/6	+⅛	6 7 4
Crompton Parkinson Ord. (5/–) ..	30	20	19/6	..	5 2 8
E. K. Cole (5/–) ..	10	Nil	6/9	+3d.	—
E.M.I. (10/–) ..	5	Nil	11/9	..	—
Electric Construction	10½	10	32/6	..	6 3 0
Enfield Cable Ord.	16½	12½	52/6	..	4 15 3
Elect. Switchgear (10/–)	16	10	20/–	..	5 0 0
English Electric ..	10	10	35/–	..	5 14 2
Ensign Lamps (5/–)	25	25	16/3	..	7 13 10
Ericsson Tel. (5/–)..	25*	22*	37/6	..	2 18 8
Ever Ready (5/–) ..	40	40	28/3	..	7 1 7
Falk Stadelmann ..	7	7½	17/6	..	8 11 6
Ferranti Pref. ..	7	7	26/3	..	5 6 10
G.E.C.:					
Pref.	6½	6½	32/6	..	4 0 0
Ord.	20	17½	80/–	..	4 7 6
Greenwood & Batley	15	13	22/6	..	11 11 2
Hall Telephone(10/–)	15	10	13/9	..	7 5 6
Henley's (5/–) ..	20	20	21/3	..	4 14 1
4½% Pref. ..	4½	4½	21/3	..	4 4 8
Hopkinsons ..	15	15	45/–	−9d.	6 13 4
India-Rubber Pref.	5½	5½	21/3	..	5 3 6
Intl. Combustion ..	32½	30	105/–	..	5 14 3
J. Lucas	15	15	60/–	..	5 0 0
Johnson & Phillips	15	15	51/3	..	5 18 10
Lancashire Dynamo	20	20	57/6	..	6 19 0
Laurence, Scott (5/–)	15	15	10/9	..	6 19 6
London Elec. Wire	7½	7½	22/6	..	6 13 4
Mather & Platt ..	13½	10	43/9	..	4 12 6
Metropolitan Elec. Cable Pref. ..	5½	5½	21/3	..	5 3 6
Murex	20	20	90/–	..	4 9 0
Pye Deferred (5/–)	25	25	13/9	..	9 1 10
Revo (10/–) ..	5	20	23/9	..	8 8 5
Reyrolle	12½	12½	55/–	..	4 10 3
Siemens Ord. ..	7½	7½	25/–	..	6 0 0
Strand Elec. (5/–)..	4	2	3/–	+1/–	3 6 8
S. Smith (1/–) ..	37½	50	7/6	..	6 13 4
Switchgear & Cowans (5/–) ..	10	15	8/9	..	8 11 6
Tel. Condenser (10/–)	Nil	5	11/3	..	4 9 0
T.C. & M.	10	10	40/–	..	5 0 0
Telephone Mfg. (5/–)	9	9	7/9	..	5 16 2
Tube Investments..	23¾	23¾	95/–	..	5 0 0
Vactric (5/–) ..	4	Nil	3/–	+3d.	—
Vickers (10/–) ..	10	10	16/3	..	6 3 1
Ward & Goldstone (5/–)	20	20	16/6	..	5 19 9
Westinghouse Brake	17½	10	46/3	..	4 6 4
Walsall Conduits (4/–)	55	55	31/3	..	7 0 9
West, Allen (5/–) ..	7½	7½	3/9	..	10 0 0

* Dividends are paid free of Income Tax.

Stocks and Shares (*Concluded from page* 213)

not be possible to complete the accounts for the year 1940 in time for the September 7th meeting called to comply with statutory requirements. A further meeting will accordingly be held when the completed figures become available.

International Telephone and Telegraph

Figures have just been published of the year's results of the International Telephone and Telegraph Company, figures which are on so stupendous a scale that they are difficult for the ordinary mind to grasp. The company is one of the largest of its class in the world, and sometimes the doubt has been expressed whether now that operations have become so huge, and so widely spread, any body of directors can properly control them. The net income of the parent company for the quarter is $230,000 less than that for the corresponding period last year.

The I.T.T. is largely interested in telegraph, telephone and cable manufacturing companies in both hemispheres. Some of them pay very well; others are in a bad way. A few of the companies operate almost entirely in Great Britain. I.T.T. shares, it will have been noticed from our price lists, very rarely change hands. The last bargain recorded in the Stock Exchange lists was at 2⅜ on July 17th. The company paid 15 cents. dividend in December, 1931, and has made no further distribution on its ordinary capital stock since then.

Home Electricity Shares

The buying in the last few business days has been largely on behalf of what are called institutional investors—trust companies and similar bodies—who are investing funds surplus to those which they employ in British Government securities, the intention being, of course, to raise the average return. Now that the yield on such gilt-edged ordinary shares as those in the Home electricity supply companies has reached a level of barely 4½ per cent., it is not surprising to find inquiry stretching out into other directions, where the return on the money is somewhat higher. Nevertheless, the ordinary shares of the Home electricity supply companies, though they give comparatively modest returns, continue in steady demand, and it is no exaggeration to assume that the market supply of stock is so small as to be almost negligible.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specifications (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1939

23380. "Electro-magnetic remote-control devices." E. A. Derungs. August 18th, 1938. (Cognate application, 23381/39.) (538590.)

26874. "Telephone systems." Standard Telephones & Cables, Ltd. September 30th, 1938. (538552.)

27287. "Electrical protective systems." Perak River Hydro-Electric Power Co., Ltd., and M. P. Croxford. October 5th, 1939. (538434.)

27770. "Electric periodic wave repeaters and generators." Hazeltine Corporation. October 21st, 1938. (Cognate application, 27771/39.) (538553.)

29100. "Electrical apparatus for measuring relative acceleration." D. Napier & Son, Ltd., and F. R. F. Ramsay. October 31st, 1939. (538436.)

29598. "Photographic cameras with photo-electric control devices." P. E. Henriksen. November 8th, 1938. (538511.)

31751. "Refrigerator cabinets." Electrolux, Ltd. December 22nd, 1938. (538562.)

33010. "Electrical systems of control for lifts." Express Lift Co., Ltd., and S. T. Hunt. December 29th, 1939. (538476.)

33047. "Electrical capacity boxes." Muirhead & Co., Ltd., and J. A. B. Davidson. December 29th, 1939. (538440.)

1940

406. "Control arrangements for electro-magnetic switches." General Electric Co., Ltd. and E. H. Croft. January 8th, 1940. (538597.)

901. "Refrigeration systems." Distillers Co., Ltd., and A. J. V. Underwood. January 7th, 1941. (538441.)

1850. "Control of electric lifts." J. R. Fothergill. January 30th, 1940. (538519.)

1933. "Radio remote control systems." Marconi's Wireless Telegraph Co., Ltd. January 31st, 1939. (538521.)

1951. "Butt welding and butt welded work." Babcock & Wilcox, Ltd., H. Harris and J. E. Jones. February 1st, 1940. (538570.)

1957. "Cathodes for electron-discharge devices and alloys therefor." Marconi's Wireless Telegraph Co., Ltd. February 1st, 1939. (Addition to 534154.) (538479.)

1991. "Commutators for dynamo-electric machines." Hoover, Ltd., C. B. Colston and W. C. Bell. February 1st, 1940. (538480.)

2068. "Metal to glass seals." Standard Telephones & Cables, Ltd., and W. T. Gibson. February 2nd, 1940. (538485.)

2069. "Variable gain thermionic amplifiers." Standard Telephones & Cables, Ltd., A. H. Roche and T. Blashill. February 2nd, 1940. (538486.)

2112. "Automatic electrode control apparatus for arc furnaces." Siemens-Schuckert (Great Britain), Ltd., and F. S. J. Leigh. February 2nd, 1940. (538571.)

2186. "Impulse senders for use in telephone or like systems." Automatic Telephone & Electric Co., Ltd. February 24th, 1939. (538601.)

2219. "Electric systems for the transmission of statistical data." British Tabulating Machine Co., Ltd. February 3rd, 1939. (538603.)

2231. "Statistical or like records, and record-reading devices." British Tabulating Machine Co., Ltd. February 3rd, 1939. (538604.)

2235. "Direct-current generators for arc-welding." A. Abbey (Wilson Welder and Metals Co., Inc.). February 5th, 1940. (538605.)

2239. "Electric systems for the transmission of statistical data." British Tabulating Machine Co., Ltd. February 3rd, 1939. (538607.)

2295. "Resonators used in ultra-high-frequency electron-discharge apparatus." Standard Telephones & Cables, Ltd., and W. T. Gibson. February 6th, 1940. (538573.)

2298. "Method of, and means for, measuring high-frequency voltages." Standard Telephones & Cables, Ltd., and J. H. Fremlin. February 6th, 1940. (538610.)

2361. "Ultra-high-frequency electron-discharge devices using resonators." Standard Telephones & Cables, Ltd., and W. T. Gibson. February 7th, 1940. (538614.)

2362. "Electro-plating metals." Dow Chemical Co. March 1st, 1939. (538615.)

2363. "Electro-plating magnesium and alloys thereof." Dow Chemical Co. March 13th, 1939. (538616.)

2396. "Magnetic field structures for induction heating devices." Reed-Prentice Corporation. March 1st, 1939. (538524.)

2411. "Ultra-high-frequency electron-discharge devices using resonators." Standard Telephones & Cables, Ltd., and W. T. Gibson. February 8th, 1940. (538623.)

3428. "Arrangement for automatic or manual selectivity or tuning control of electric oscillatory circuits." L. L. de Kramolin. February 25th, 1939. (Addition to 510862.) (538630.)

3573. "Insulated electric conductors." Philips Lamps, Ltd. January 18th, 1940. (538447.)

3819. "Apparatus for recording and reproducing sound." H. Davies. February 29th, 1940. (538527.)

3993. "Methods of controlling the speed of alternating-current motors." British Thomson-Houston Co., Ltd., J. H. Walker and B. Adkins. March 4th, 1940. (Addition to 457460.) (538631.)

4208. "Electric motors and/or generators." Siroma Engineering Co., Ltd., and F. Kacser. March 6th, 1940. (538493.)

5626. "Electric switches." Lee, Howl & Co., Ltd., and B. W. Payne. March 28th, 1940. (538457.)

5872. "Electric contacts." Johnson, Matthey & Co., Ltd. June 2nd, 1939. (538459.)

6376. "Grinding or abrading machines." Wright Electric Motors (Halifax), Ltd., and H. H. Wright. April 9th, 1940. (538466.)

6569. "Artificially cooled high-pressure mercury-vapour discharge tubes." Naamlooze Vennootschap Philips Gloeilampenfabrieken. April 14th, 1939. (Addition to 484143.) (538535.)

(*Continued on page* 217)

7754. "Electro-magnetically operated contactors." British Thomson-Houston Co., Ltd., and E. B. Tuppen. April 30th, 1940. (538502.)

7933. "Impulse couplings for magnetos." Wico Electric Co. May 6th, 1939. (538534.)

8419. "Automatic cut-outs for electrically heated kettles, coffee percolators, or other cooking utensils." W. T. French & Son, Ltd., and A. W. French. May 10th, 1940. (538537.)

9183. "Piezo-electric elements." Standard Telephones & Cables, Ltd. August 2nd, 1939. (538541.)

9679. "Sealing apparatus particularly applicable to the manufacture of electric lamps." British Thomson-Houston Co., Ltd. June 1st, 1939. (538542.)

9729. "Electric hotplates." Cona, Ltd., and G. F. Brinkman. June 3rd, 1940. (538543.)

10368. "Electric circuit control systems particularly for illumination." Igranic Electric Co., Ltd. June 22nd, 1939. (538575.)

10369. "Electric illumination control systems." Igranic Electric Co., Ltd. July 27th, 1939. (538576.)

10637. "Electrical integrating apparatus." Sangamo Weston, Ltd. January 10th, 1940. (Addition to 538160.) (538578.)

13328. "Overload released electrical switchgear." J. A. Crabtree & Co., Ltd., and H. F. McLoughlin. August 22nd, 1940. (538582.)

1941

1071. "Television synchronising signal separators." Hazeltine Corporation. March 16th, 1939. (Divided out of 537878.) (538587.)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Bideford.—September 9th. Town Council Refrigerator for British Restaurant. (See this issue.)

Dewsbury.—September 23rd. Corporation. Reactor and voltage regulator. (See this issue.)

Leeds.—City Council. Installation of electric lighting in dormitory shelters at food and rest shelters. W. S. Cameron, city engineer.

Morley (Yorks).—Town Council. Change-over of installations from single-phase to three-phase. Borough electrical engineer.

New Zealand.—AUCKLAND HARBOUR BOARD.—September 30th. Ten 5-ton electric cranes.

Salford.—September 17th. City Council. Three-phase oil-immersed power transformers. (August 29th.)

South Africa.—SALISBURY (S. RHODESIA).—September 29th. Two 2,500-kW turbo-alternators and exciters with complete condensing and auxiliary plant. (August 15th.)

October 13th. City Council. Stoker-fired water tube boilers and other power station plant. (August 29th.)

October 27th. Switchgear, transformers, reactors together with auxiliary apparatus. (August 29th.)

DURBAN.—October 3rd. City Council. Overhead line material for trolley-bus operation (contract S.1972). 3/0 trolley wire (contract S.1973). Overhead line material for tramway operation (contract S.1975).

October 17th. Telephone cable (contract P.261). 72 transformers (contract E.2032).

POST OFFICE.—September 11th. One battery of seven cells. (P.O. tender 14.)

December 4th. Equipment for radio-telephone link between Maseru and Mokhotlong.

Sunderland.—September 15th. Education Authority. Wiring for electric lighting installations in a number of school air-raid shelters. (August 29th.)

Orders Placed

Manchester.—Electricity Committee. Accepted. Cables.—Scottish Cables, Ltd.; Hackbridge Cable Co., Ltd. Low-pressure pipework.—Brightside Foundry & Engineering Co., Ltd. Low-pressure valves.—J Blakeborough & Sons, Ltd.

Transport Committee. Accepted. Bus batteries.—Chloride Electrical Storage Co., Ltd.; Oldham & Son, Ltd.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Amble.—Communal feeding centre; U.D.C. surveyor.

Annan.—Reconstruction of Queensberry Hotel (£30,000), for Town Council; burgh surveyor, 31, Addison Place.

Ashton-under-Lyne.—Switch house and battery room, for Town Council; Lindley & Gibson, architects, Market Avenue.

Bexley.—Nursery at junction of Lovel Avenue and Upper Wickham Lane; W. Woodward, town clerk, Council offices, Bexleyheath.

Bingley.—Additions to House Farm Mansion, for U.D.C.; E. O. Robinson, surveyor, Town Hall, Bingley.

Blaydon-on-Tyne.—Extensions to communal feeding centre at Shibdon Cottage; T. Mills, surveyor, U.D.C. offices, Blaydon-on-Tyne.

Bridgend.—Kitchen and nurses' dining room accommodation at Mid Glamorgan County Hospital, for Glamorgan County Council; county architect, Glamorgan County Hall, Cardiff.

Brockhill.—New pumping station; chief engineer, East Worcestershire Waterworks Co., Bromsgrove.

Clayton.—Works extensions, W. H. George & Son, architects, 7, Warrington Street, Ashton-under-Lyne; Wellerman Bros., Ltd., builders, Edward Street, Hyde.

Dodworth.—Canteen; secretary, Old Silkstone Collieries, Ltd.

Durham.—British Restaurant for the City Council; city engineer.

Easingwold.—Two chlorinator houses and plant, for R.D.C.; Fairbank & Son, engineers, Barclays Bank Chambers, St. Helen's Square, York.

Eccles.—Alterations to St. Andrwes schools; R. Martin, architect, 90, Deansgate, Manchester.

Eire.—DUBLIN.—Proposed Municipal Buildings extension, and two tuberculosis sanatoria, Ballyfermont and Ballyowen, for Town Council; H. G. Simms, architect, 5, Wellington Quay.

LIMERICK.—Art gallery (£2,000), for Town Council; C. Stenson, borough engineer.

Falkirk.—Three shelters with equipment for feeding 500 and 1,000 people; burgh surveyor.

Harwich.—British Restaurant at St. Nicholas Hall (£900), for Town Council; borough surveyor's office, Harwich.

Hinckley.—Additions to hosiery works; Bennett Bros. (Hosiery Manufacturers & Dyers), Ltd., Southwell Road.

Horden (Durham).—Restaurant, including electric cooking equipment (£6,000); miners' lodge secretary, Miners' Hall, Horden.

Isle of Ely.—Alterations to kitchen at Ely High School (£1,780), and erection and equipment of classrooms at Wisbech High School as dining rooms, for County Council; county architect, County Hall, March.

Lichfield.—New machinery in laundry at Isolation Hospital, Wissage, for Mid-Staffordshire Joint Hospital Board; A. N. Ballard, clerk to the Board.

Manchester.—Shops at Wythenshawe, for Housing Committee; J. Hughes, housing director, Town Hall.

Conversion of buildings for more British Restaurants; G. Noel Hill, city architect, Town Hall.

Extensions to motor omnibus station, Parker Street, for Transport Committee; B. Pilcher, transport manager, Transport Offices, Piccadilly.

Middleton.—Additions to the Jolly Butcher inn, Bowlee; Cornbrook Brewery Co., Ltd., Ellesmere Street, Blackfriars, Manchester.

Montrose.—Factory and store; Chivers & Sons, Ltd.

Newbury.—Pump house, for Town Council; water engineer, Municipal Buildings.

Newcastle-on-Tyne.—Hostels; C. Parr, city engineer, Town Hall.

Northenden.—Additions to works, Sharston Road and Longley Lane; Cruickshank and Seward, architects; B. Smith, builder, 60, Chapman Street, Manchester, 15.

Northern Ireland.—BELFAST.—Alterations at the Town Hall (£1,800); city surveyor, City Hall, Donegall Square.

DONAGHADEE.—Residence at waterworks, six shelters, and extensions to cleansing station at Commons, for U.D.C.; H. L. Taggart, surveyor, Town Hall.

Patricroft.—Office extensions; Sir W. H. Bailey & Co., Ltd., Salford.

Redcar.—Garage, Kirkleatham Lane; borough engineer.

Rusholme.—Additions to factory, Rusholme Road, Matley Brotherton and Mills, architects; Tinker and Young, Ltd., builders, Monsall Street, Manchester, 9.

Ryton-on-Tyne.—Communal feeding centres for Urban District Council; T. Charlton, surveyor, U.D.C. offices, Ryton-on-Tyne.

Salford.—Day nursery in Hulme Street; W. A. Walker, city engineer, Town Hall, Bexley Square.

Skegness.—Alterations and additions to kitchen at senior School; P. W. Birkett, county architect, County Offices, Newland, Lincoln.

Stockbridge.—Fire station, for Romsey and Stockbridge R.D.C.; surveyor, Council offices, Duttons Road, Romsey.

Stockton-on-Tees.—Central kitchen (£3,000); borough engineer.

Stourbridge.—Garage buildings, etc., at Birmingham Street Depot, for Town Council; G. N. Maynard, borough engineer, Council House.

Stratford-on-Avon. — Additions to hospital (£1,200), for R.D.C.; secretary to Joint Hospital Committee.

Sunderland.—Adaptation of premises as children's nursery; borough engineer.

Swinton.—Houses; A. Cordwell, borough surveyor, Town Hall, Chorley Road, Swinton, Lancs.

Tividale.—Bakery extensions; R. Walton, Ltd., confectioners, 298, Dudley Road, Tividale, near Tipton.

Turton.—Hostel for 30 boys; R. Dart, surveyor, Council offices, Bromley Cross, near Bolton.

Tyldesley.—Conversion of premises into communal feeding centre, for U.D.C.; N. Chamberlain, surveyor, Town Hall, Tyldesley, near Manchester.

Tynemouth.—Establishment of 14 emergency feeding centres, for Town Council; borough engineer, 19, Howard Street, North Shields.

Urmston.—Flats; E. L. Leeming, surveyor, Council Offices, Crofts Bank Road, Urmston.

Wallsend-on-Tyne.—Communal feeding centre and a P.A.C. kitchen; T. Clements & Sons, contractors, Selborne Gardens, Newcastle-on-Tyne.

A canteen at the works of Parsons Marine Engineering Co., Ltd.; J. L. V. Couves & Partners, Westfield Avenue, Gosforth, Newcastle.

Welshpool.—Public abattoir; Capt. W. M. Evans, Town Hall.

West Riding.—Remand home at Barnsley, for County Council; county architect, Wakefield.

Whaley Bridge.—British Restaurant, for U.D.C.; W. Butler, surveyor, Council offices, Market Street.

Whitefield.—Conversion of hall into cinema, P. Hamer, Ltd., building contractor, 15, Parl Street, Swinton, Manchester.

THE
ELECTRICAL REVIEW

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Friday, September 12, 1941

Contents

	Page		Page
Editorial—Wartime Heating	219	Earthing Systems and Tests. By "Rotor"	235
Space Heating	221	America's Defence Needs	237
Correspondence	226	Production Coil Testing. By H. G. Dunn and E. A. Farthing	238
Personal and Social	227	Recent Introductions	239
Canadian Utilities and the War	228	Commerce and Industry	240
Rationalising Cables. By H. J. Allcock, M.Sc.	229	Electricity Supply	243
Pulverised-Fuel Firing. By V. Walker	231	Electricity in the Empire	244
Paint Drying by Infra-Red Radiation	233	Financial Section	245
Sag and Tension. By M. P. Romeira	234	New Patents	250
Classified Advertisements	75	Contract Information	251
		Index to Advertisers	86

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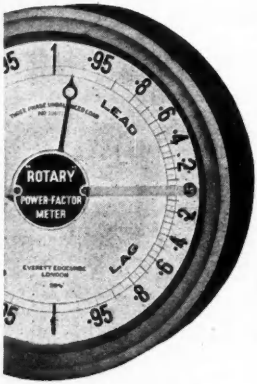

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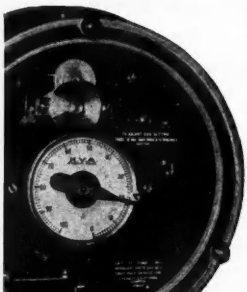

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